

OCTOBER, 1959

VOL. II, NO. 6

Problems of Economics

ВОПРОСЫ ЭКОНОМИКИ

English Translation of the U.S.S.R. Monthly Journal VOPROSY EKONOMIKI

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Technical Progress in the Period of the All-Out Upbuilding of Communism

Some Problems in Stimulating Production and Introducing New Technique

Decisive Conditions for the Fulfillment of the Seven-Year Plan

Raising the Workers' Material Self-Interest in the Introduction of New Technique

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New Draft Standards for Amortization Deductions in Ferrous Metallurgy

Problems of Distribution of the Food Industry of the USSR

A Book by American Economists on the "Input-Output Method"

The Journal of the U.S.S.R. Academy of Sciences, Institute of Economics

AUTHORIZED TRANSLATOR AND PUBLISHER . . .

INTERNATIONAL ARTS AND SCIENCES PRESS

33 WEST 42nd STREET • NEW YORK 36, N. Y.



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PROBLEMS OF ECONOMICS

English Translation of the U.S.S.R. Journal Voprosy Ekonomiki

EDITOR AND PUBLISHER: MYRON E. SHARPE

Problems of Economics is the English language translation of *Voprosy Ekonomiki*, journal of the Institute of Economics, U.S.S.R. Academy of Sciences. The translation is authorized by arrangement with Mezhdunarodnaya Kniga, Moscow.

Problems of Economics is a complete, literal translation, without editorial comment, of *Voprosy Ekonomiki*.

Twelve issues per year. Subscription rate: \$50.00 per year (twelve issues); \$4.50 per copy. \$20 per year to persons associated with institutions already subscribing.

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The Publisher

INTERNATIONAL ARTS AND SCIENCES PRESS

33 West 42nd Street, New York 36, N. Y.

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Klimenko:

Technical Progress in the Period of the All-Out Upbuilding of Communism

The 21st Congress of the Communist Party, Soviet Union, heralded the entry of our country into the period of the building of communism. The main problems of this period — the creation of the material-technological basis of a communist society, further strengthening the economic and defensive might of the USSR and at the same time more fully satisfying the growing material and cultural needs of the people. The achievement of these aims must be assured by quickening the pace of technical progress in all branches of our national economy, and the continued growth in productivity of social labor. "The building of the material-technological basis for communism," stated Comrade N. S. Khrushchev, at the 21st Congress of the Communist Party, Soviet Union, "presupposes, first of all: a highly developed modern industry, full electrification of the country, scientific-technological progress in all branches of industry and agriculture, composite mechanization and automation of all industrial processes, fullest utilization of new sources of energy, rich natural resources, new synthetic and other materials, growth of the cultural-technical level of all workers, further improvement in the organization of labor and increased productivity of labor."

The decisive condition for the successful fulfillment of the tasks of the seven-year plan is the introduction of new technology on the widest scale, and composite mechanization and automation of industrial processes. The Central Committee of the Communist Party made a decision to call a Plenary Session and evaluate the progress in fulfilling the decisions of the 21st Congress on the introduction of composite mechanization into industry and construction, automatization of production, establishment of mass production, and replacement of obsolete equipment, dies and molds. An examination at the Plenum of these basic questions of technical progress will assure the further expansion of industrial production and construction, improve the quality of materials produced and reduce production costs in industry and construction. By such means we will be quickening the period of the building of the material-technical basis for communism in our land.

Within a period of 41 years, no less than 18 years of which were taken up with the Civil War, the Second World War and the postwar reconstruction period, the Soviet Union has advanced to the highest level of world technique, established the predominance of machine production in all branches of industry and the mechanization of basic production processes. The industry in the USSR is rapidly approaching the annual production of the U.S.A. The output of the Soviet machine tool industry is about 70% of that of the U.S.A., and the tool reserves of the USSR according to calculations have reached about 5/6th of that of the U.S.A. The output of steam and hydraulic turbines in the USSR is about half of the output of turbines in the U.S.A. during the last six months.

With the coming seven-year plan, the output of modern means of production for many of the major branches of Soviet industry will equal the level attained by the U.S.A., and in certain types of technique will surpass the U.S.A. Thus, the output of metal cutting tools, which largely determines the technological equipment of the machine building industry — and which is basic for the technological progress of the entire national economy — will reach in 1965, 190,000 to 200,000 units, or almost equal to the maximum annual output of machine tools in the USA (in 1953-1957 it was 200-210,000. The production of turbines, which is basic for electrification, will increase by 1965 as against 1958 by 2.8 to 3.1 times and will reach a general capacity of 18.7 to 20.4 million kilowatts, i.e., will exceed the annual turbine output of the USA in recent years (16-17 million kws.). By 1965 the USSR will surpass the USA in the production of steam and electric locomotives with an output of 2,550 to 2,700 of 8.4-9 million horsepower. During the seven-year plan the output of chemical equipment will increase by 3.2 to 3.4 times, the output of the instrument-making industry will increase from 2.5 to 2.6 times (including calculating and mathematical machinery from 4.5 to 4.7 times), etc. The increased output of the chemical machinery industry will assure a more rapid pace for the expansion of chemical production throughout our national economy. The growth of our instrument making industry, particularly the electronic calculating technology, is a most important prerequisite for the extensive introduction of composite automation.

Our industry has reached the highest level of world technology, being even with that of the most highly developed capitalist countries and in many areas has already surpassed them.

Soviet scientific-technical ideas now occupy a foremost position in the field of peaceful use of atomic energy. The first atomic electric power station was built in the USSR. At the present time there is being carried through a large scale program of constructing powerful atomic electric stations with different types of reactors. We have now in operation the world's largest installation for the study of the atomic nucleus-synchrophasotron, we have launched an atomic ice-breaker and have achieved many successes in other phases of the peaceful use of atomic energy. The perfection of the inter-continental ballistic missile, the launching of artificial satellites and the first cosmic rockets — these testify to the pre-eminence of Soviet rocket technology. Well known are the achievements of Soviet aviation, expressed in the production of high speed reactive and turbo-jet aircraft. These are not isolated accomplishments. They reflect the high technological level of Soviet machine building and particularly, instrument making, radio technique, electronics and other leading branches of industry.

Soviet science, technology and productivity are leading

other countries in a number of branches of construction, electric power and metallurgy. As an example we can cite the period for building hydroelectric stations. The Kuibyshev hydrostation, the most powerful in the world, was built in seven years, while the largest station in the USA — Grand Coulee Dam — was built over a period of twenty years. We built a 300-meter dam over the Volga on the Kuibyshev hydroelectric scheme in 19 hours, while a similar operation on the Missouri in 1952 required five days under much more favorable conditions (in particular, the water expenditure on the Missouri project is five times less than on the Volga at Kuibyshev). The USSR is now developing the largest electric power system EES in the European part of the country and EES in Siberia, and there remains the more distant perspective of uniting all electric power systems in the USSR into one high voltage circuit, which requires the solution of many complex scientific-technological problems. Then there is the electrification of the main railway lines of Moscow-Kuibyshev-Chelyabinsk-Novosibirsk-Irkutsk. The USSR is also leading other countries in metallurgical technique. We are now designing a blast furnace with a capacity of 2,286 cubic meters (the useful capacity of the largest blast furnace built in the USA in June, 1955 is 1,810 cubic meters). The extent of utilization of metallurgical aggregates, particularly open hearth furnaces, is 25-30% higher in the Soviet Union than in the USA and for the best blast furnaces in the USSR (the Magnitogorsk Works) the rate of utilization of useful capacity of blast furnaces is 1.3 to 1.5 times higher than the indexes attained on the best blast furnaces in the USA. During the present seven-year plan we will further extend our lead in all branches of technology where we now surpass the capitalist nations. Completion of the tasks set forth in the seven-year plan will make possible a further intensified development of all branches of new technique. The possibilities for new technical achievements will be greatly advanced as we realize the tasks of the seven-year plan in connection with the development of machine building, instrument making, radio-electronics, electro-technology, the construction of new and more highly perfected equipment for the metallurgical, chemical, petroleum and gas industries, etc.

The expansion of the machine building industry, provided for in the seven-year plan, will make it possible to supply all branches of our national economy with the most modern equipment, basically improve production technology, advance to the composite mechanization and automation of production controls with the use of electronic devices, construct machinery and apparatus based on the latest scientific achievements — particularly radio-electronics, superconductivity, ultrasonics, radio-active isotopes, semiconductors, nuclear energy, etc. The seven-year plan will create the indispensable conditions for an even more rapid growth of all branches of science for the carrying out of important theoretical investigations and new important scientific discoveries.

At the present time, the development of technique in the USSR is characterized by the fact that the level of Soviet technology not only equals, but in many branches has already surpassed, the most developed capitalist nations, as well as by the rapid expansion of many new branches of technology — atomic, rocket and reactive, radio-technique and radio-electronics, production of rapid mathematical calculating machines, semi-conductor technique, machine tool building, etc. The USSR is entering into an epoch of a great technological revolution. This creates particularly favorable conditions for accelerating the process of the transition of our country to communism.

The industrial revolution at the end of the 18th century

laid the technical basis for machine production required for capitalism; the technical revolution of the mid-20th century will assure a rapid tempo for creating the material basis for communism. The industrial revolution led to a rapid development of industry. Contemporaries compared it to an "explosion" and spoke of the "incomparable speed of the changes. (1) The introduction of machine production made it possible for the factory system to take a colossal leap forward. With the changeover from hand to machine production, the productivity of labor during the first 40-50 years of the industrial revolution increased by 130-fold.

The present day scientific-technical revolution will assure a many-fold faster and more powerful tempo of industrial growth. We live in an age of the enormous quickening of scientific and industrial progress, in an epoch of the most rapid succession of scientific discoveries, qualitative leaps in technology, when the physico-mathematical, chemical, biological and other sciences are opening up new horizons at an ever accelerating pace; when the transition to the automatic control of vast power-systems in a hundredth of a second and a hundred thousandth of a second; when new sources of energy are becoming available that are millions of times more powerful than those existing heretofore, etc. The dynamism and intensity of technical advances of our age is many times greater than ever before known to mankind. The possibilities of 'explosive' leaps in technique are much greater today than at any previous period.

The most important aspect of the present technical revolution is that it is a revolution in the methods of production. The industrial revolution at the end of the 18th century essentially left unchanged in many fields of production the basic methods of hand labor, depending on the limited possibilities of manual labor, such as the making of thread, forming metal products by chipping, brick forming, etc. The machine technique of the industrial revolution only multiplied by several times these operations, the products of labor and the end products. These methods have remained unchanged in many branches of production for almost 200 years after the 18th century industrial revolution. At the present time they greatly hamper the tempo of further industrial progress.

Thanks to the scientific achievements of our times there open up great possibilities for basically changing these production methods, creating the preconditions for establishing the production processes on new foundations, with much more effective methods, looking forward to the complete elimination of manual labor. The present revolution in production methods gives promise of a vast growth in the productivity of labor and volume of output. Its main direction is toward the general transition to mass, continuous intensive processes (with maximum application of thermal, thermochemical and chemical methods), on a strictly scientific basis, with automatic control, independent of methods of manual labor and of the human muscular and nervous system. The development of automation, electronics, cybernetics, frees human labor of the necessity of directly participating in the production process. The present highly efficient productive processes require that people provide only an initial task and general direction; the operating control and regulation is accomplished automatically. With new technique there will take place a basic change in the character of labor's role in the production process, eliminating it from direct participation in this process.

This technical progress expresses itself in perfecting tools of production, in improving technological methods, in increasing the amount and variety of facilities for the production of material, in utilizing ever more effective sources

energy and in raising the technical standards of the final product.

Technical progress requires first of all improvement in the tools of labor. "Economic epochs are distinguished not by what is produced but by how production is carried on, by the instruments of labor used." (2) The utilization of new instruments of labor will result in a break with existing technology, set new requirements for the qualities of tool equipment and will raise the technico-productive characteristics of the end product. It would be incorrect and an oversimplification to attribute the content of the technological progress to the perfection of the tools of production. Only under conditions of the simultaneous, mutually connected and mutually stimulated perfection of the tools of labor, increasing technology, the quality of raw material and the technical level of the end product, can there be full realization of the possibilities for technical progress and its highest tempo be assured.

The instruments of production have a determining influence on technology. As the equipment is improved, technology changes. But we must not lose sight of the reserve, the influence of perfections in technology on the improvements in making equipment. With the mastering and development of technology there open up new possibilities which require for their utilization the production of new and better types of equipment.

Along with the technical re-equipment of Soviet national economy in all branches of industry there has taken place an intensive effort to introduce the newest equipment, which requires the systematic improvement of technology. The new technology was worked out gradually to the extent that the new equipment was mastered. The introduction of progressive technology, assuring the full utilization of present means of production, lagged behind the putting into production of new types of machine technique. There was therefore projected the proposition that technology is a passive element of the technological process, wholly determined by the character and possibilities of the equipment used. However, while the tools of production play a dominant role amongst all elements of technical progress, technology has an important counter-influence on the perfection of equipment.

As an example we can cite the introduction and development of high speed metal cutting methods. The intensification of the technique of metal cutting led to a substantial change in the equipment, to an increase in the power of the motors, improvement in the transmission, in the instruments and equipment, etc. Many other examples could be cited of the influence of newly introduced progressive technology on the improvements in equipment design. Frequently the development of technology results in the design of entirely new machinery. It is well known that the introduction of mass production methods had a big effect on the development of special, highly productive machine tools. The highly progressive precision investment casting method was at first applied with primitive equipment and mainly with manual labor. Only to the extent that these new methods of casting technology were mastered, was there developed more highly perfected equipment. In the textile industry, the need for technically uniting most processes will result in the development of new types of machinery combining many of the formerly independent technological processes.

At the present stage of development the interaction of the influence of equipment on technology and technology on the design of machinery stands out even more strongly. The planning of the most effective technology calls for the simplest and most effective utilization of all possibilities

inherent in present-day industrial equipment; on the other hand, the building of new machinery must answer the requirements of progressive, scientifically-based technology. The proper understanding of the inter-connection and interaction in the development of equipment and technology has great significance for the intensification of the tempo of technological progress, for deepening and speeding the work of the scientific-research and design and construction institutions. The interdependence of means of production and technology should also be reflected in the organization of scientific-research work. The closer tie between the work of technologists and designers will result in the further increased tempo in improving production in all branches of the socialist national economy.

For a correct understanding of the tendencies and laws of development of the material-technical base of production in the period of the unfolding of the building of communism, it is necessary that we fully eliminate from our thinking the widely disseminated fallacy to the effect that the objects of labor used in the production of materials are a passive element in the expansion of the productive forces, as something having no effect on the course of technological progress. This view contradicts the Marxist conception as to the role of productive forces. The objects of labor used in the production of materials can become a drag on technical progress as well as the impetus for big revolutionary leaps in technique, in the perfection of equipment and technology, in improving the quality and technical standards of the end product. It is well to remember, in this connection, the role played by light metals in the development of aviation, uranium ore and other radioactive materials in opening up the epoch of nuclear energy, polymer materials for the revolution in the chemical industry and in production of all materials, alloying elements, stainless steel, semi-conductors, isotopes, titanium, germanium, zirconium, chemically pure elements, etc. — for the outstanding successes of modern technique. The present level of development of technique places on materials requirements which often cannot be met by natural raw materials. Here a big role is played by new synthetics, in particular polymer materials, artificial semi-conductors, etc. The vast expansion of the chemical industry, envisioned in the seven-year plan, is one of the decisive directions by which the material-technical basis of communism will be created.

An active and revolutionizing role in technological progress is played by the character of the end product. The appearance of such types of articles as the automobile and airplane signalized an entire epoch in the growth of production technique. The rise of mass production of automobiles had a powerful effect on the technique of all branches of production. This is also true of the organization of airplane construction. Such types of products as artificial earth satellites, cosmic rockets, etc. testify to the great possibilities of present-day technology and production. Extension of the scale of this type of production will no doubt necessitate important changes in production technique, having indeed a revolutionizing effect on the development of the most diversified branches of production.

A most important influence on technical progress is the development of atomic energy. The 21st Congress devoted considerable attention to the problems of utilization of atomic and thermonuclear energy. The utilization of these new types of energy, a million times more effective than the energy of mineral fuels and water power, promises a vast increase in the productivity of social labor. The seven-year plan provides for the construction of a number of large atomic power stations with different types of reactors. The experience in building and operating these installations will

help determine the most effective direction, in terms of technical-economic indexes, for the further development of atomic energy. The seven-year plan sets forth as one of the major directions for scientific investigation the problem of controlling thermonuclear reactions. The final solution of this problem will forever free mankind of the problem of providing power for industrial production.

The resources of atomic and thermonuclear energy are practically inexhaustible. The earth's content of uranium and thorium is generally estimated to contain energy resources exceeding 10 to 20 times the reserves of coal and petroleum combined. Heavy water, the raw material of the thermonuclear reaction, is contained in ordinary water in sufficient quantities to satisfy all the energy requirements of mankind. Along with the utilization of the vast energy resources lying in the womb of the atom, on the basis of the successes of semi-conductor technique, a new source of energy will emerge — the direct transformation of solar energy into electrical energy.

The basic directions for improving the means of production, technology, materials and end product is the electrification, mechanization, automation, chemicalization and intensification of production processes. The scientific-technical revolution leads to the creation and perfection of machinery and apparatus, whose operation is based on the utilization of the scientific achievements in the field of nuclear research, electronics, semi-conductors and other new scientific discoveries, which greatly enlarge the possibilities for speeding these new directions of scientific progress.

The electrification of the national economy of the USSR is now entering the stage of the creation of a single high voltage circuit, first encompassing the European part of the Soviet Union, and later the entire country. The creation of a single electric power circuit for the country is based on the utilization of the powerful energy aggregates in 200-300-600 thousand kw. with steam parameters of 130-200-300 atm. and 565-650°C and powerful feed lines with a voltage of 400-800 kilovolts. The control of such a circuit requires the utilization of modern facilities of automatics and telemechanics, assuring precise, instantaneous (to the hundredth of a second) regulation of production and the requirements of energy throughout the entire system and its different branches and the elimination of all deviations from the normal procedure.

The present seven-year plan will make huge strides forward toward the full electrification of our country. The generation of electric power will increase by 2.1-2.2 times and will reach, by 1965, 500-520 billion kwh., which is approximately the present electric power production of the USA (716 billion kwh. in 1958). There will be created a unified power system in the European part of the USSR, Central Siberia, as well as a unified system in the North-West and West, Zakavkazya, Kazakhstan and Middle-Asia. The electrification of production will be increased almost twofold. The railroads will be electrified over a distance of 20,000 km., all state farms, repair stations, collective farms and work sites. This will be a decisive step in realizing Lenin's idea about the full electrification of the country and laying the energy foundations for the technology of a communist society.

The leading role in the acceleration of technical progress, in improving industrial equipment, technology, materials and end products, belongs to the automation and chemicalization of production.

Automatization is the basis of the present-day technological revolution in production. This is the main technical basis for, the indispensable condition, for the utilization of the

inexhaustible resources of new types of energy. Only automated technique gives the possibility of controlling atomic and thermonuclear reactions and many other processes, which is not possible by the direct action of people. Automatic equipment, including electronic rapid calculating machines, determines the optimum duration of the technological process and actively maintains it in the course of self-regulation. Automation exerts a determining influence on all elements of the technical process: to assure the greatest effectiveness from automation it is necessary to make basic changes and perfect equipment, technology, materials and final product. The automatic regulation of production gives the possibilities of reducing to a minimum the use of human labor and at the same time raising to an enormous extent the productivity of social labor.

At the present time the automation of the productive process is not yet developing on a large scale. In many instances the use of automatic installations has proven to be highly effective (for example, on lines for machine tool assemblies and rotor lines). However, the full possibilities for automation are far from being realized. The most effective direction for automation — introduction of composite automatic technique along all stages of the production process, the use of electronic mathematical calculating and controlling equipment — these have not received the necessary attention.

In the decisions of the 21st Congress of the Communist Party of the Soviet Union, the composite mechanization and automatization of productive processes was considered as the main, the decisive direction for technical progress of the seven-year plan. The seven-year plan envisages the putting into operation of no less than 1300 automatic lines and the increased use of machines with automatic programming controls. There remains the problem of going over from automation of individual installations to the composite automation of sections, shops and entire plants. The decisions of the Congress noted the necessity of utilizing modern electronic calculating machines for automatic control of technological processes on the most efficient basis. Control figures have been projected for the organization of highly specialized mass production of automation facilities with the aim of carrying out the goal of composite automation of all branches of the economy.

During the period of the seven-year plan, there will be built over 50 experimental-demonstration enterprises which will embody the latest features of composite automation. The experience gathered in the operation of these undertakings will facilitate the widest introduction of automatic technique. An example of the scale on which automation will be introduced during the seven-year period can be seen from the fact that the Likhachev Moscow Auto Plant will increase the number of automated lines from 9 to 172, and Gorky Auto Plant will have 136 such lines, etc.

At the present time we have not yet fully completed the stage preceding automation, that of composite mechanization. The basic productive processes in most branches of industry have been fully mechanized; however, on the auxiliary branches of industry there is frequently a predominance of hand labor, because of the fact that as a rule they have not taken place the composite mechanization of entire plants. Therefore, along with the development of automation, the control figures call for the completion of the composite mechanization of production. This applies first of all to such backward branches, in terms of mechanization as foundry and press-forging in machine building, as well as in transport and loading and unloading work in all branches of the economy.

The chemicalization of production is one of the most

important directions of technical progress at the present time. It will increase and improve the nomenclature used in the production of materials, will guarantee the transition to ever more effective and economical materials, whose properties will meet the growing demands of technology, extend the use of new chemical methods, and intensify production processes. The achievements in chemistry and technology will open possibilities for the cultivation of new cultures many times more effective than usual agricultural plants, with a tenfold better utilization of solar energy, as well as artificial photosynthesis of food substances without the aid of plants.

The scientific-technical revolution will result in the development and use of entirely new, fully transforming production processes, technical methods such, for example, as the use of plasma — the recently discovered state of substances — super temperature, magnetic pole, etc.

An analysis of the main tendencies of the unfolding scientific-technological revolution makes it possible to foresee the following main outlines of the technical basis of production during the higher stage of communism: the creation of a highly productive, self-regulating automatic system of machinery assuring maximum output, the energy base of which will be atomic and thermonuclear power, and the raw material, the most effective type of materials processed on a mass production basis with the aid of a highly developed metallurgy and chemical industry. Such a system of machinery will make possible the application of the principles and methods of the most highly perfected, most highly productive scientific technology, eliminating heavy physical labor, transform labor into scientific and engineering-technical activity, with the programming and general control accomplished by automatic systems. Labor will basically alter its character, and will cease being exhausting and monotonous, mechanically repetitious and excessively arduous. The establishment of an automated system of machinery will assure a vast increase in labor productivity, and a great surplus of products. It will lead to a shortening of the workday; it will transform labor into the first vital requirement of man; it will enable the workers to devote the bulk of their time to the highest form of intellectual labor, and will reduce the time devoted by society to necessary productive labor. This will lead to the further flowering of culture.

The seven-year plan reflects in the fullest sense the tendencies of modern scientific-technical progress. The conclusions set by the 21st Congress of the Communist Party of the Soviet Union provide for the many-sided introduction into production of the newest attainments of science and technique, providing the necessary conditions for the rapid development of all fields of science.

However rapid the technical progress of the present-day technical revolution, the main problem facing socialist society in transition to communism is the maximum acceleration of this tempo.

The enormous technical and productive possibilities opened up by the technical revolution cannot be fully utilized and realized by capitalism, since they are tied up with mass unemployment which is catastrophic for capitalism. These possibilities of the technical revolution can be only fully and most effectively utilized by a socialist society. The characteristic feature of the modern technical revolution is the fact that the development of different branches of science and technology are interrelated and mutually conditioned. The attainment of highest results requires unity and coordination of work in all branches of science and technology. Such unity and coordination, the mutual stimulation of all branches of science and technology and the

concentration of all forces of science from different specialties on the solution of important problems, can be achieved only by a socialist society.

The seven-year plan provides for the concentration of scientific forces and resources on the most important researches having theoretical and practical significance. With the high interconnection of all branches of science and technology, scientific progress demands that we speed the lagging areas in the scientific-technical sphere. In industry the introduction and mastery of the newly designed machinery and automated lines will require a period extending over many years. The renewal of the machine tool reserves and the creation of new types of technique in different branches of industry takes time; composite automation proceeds very slowly even in those industries where conditions are most favorable.

The basic method for speeding the tempo of technical progress, in the light of practical experience in socialist construction, is the unification and coordination of forces on the solution of scientific problems having foremost significance for technology, assuring unity, coordination and mutual effort in the development of different branches of science and technology, and strengthening the bonds between science and practice. It is necessary to properly harmonize three groups of work: solution of the most important theoretical problems providing basic, revolutionizing shifts in science, technique and production, working out the main knotty problems for perfecting existing technique with the aim of raising it to a higher level in everyday, continuous technical progress in all enterprises of our country.

To the first group, providing the basic revolutionizing impetus in science, technique and industry, belongs the work of investigating cosmic rays, nuclear reactions, semiconductors; in physics, the solution of mathematical problems related to the development of automation, particularly, problems of calculating technique with the aid of mathematics; theoretical research directed toward introduction of newly perfected technological processes and development of synthetic materials with properties satisfying the problems presented by modern technique; in chemistry, the development of biochemistry, agrochemistry, biophysics, microbiology, virusology, selection, genetics and other promising branches of biological science. The seven-year plan envisions the creation of the necessary conditions for great new scientific discoveries in the many branches of knowledge. In the textile industry, the first group has to investigate the possibilities of eliminating threads and fabrics produced by the combination of billions of thread and go over to the use of materials made without threads by means of molding, rolling, and other methods of the monolithic production process.

As an example of scientific-technical activity required to make possible a basic improvement in existing technique and technology, we can consider the typification of technological processes with the introduction of more effective and productive scientifically-worked-out processes and setting advanced norms corresponding to these processes; work towards the composite improvement of technology and organization of production with increased technical and economic effectiveness of mechanization and automation; perfection of new highly productive machinery, formulation of the best means of specialization, cooperation and combination, problems of economic stimulation of technical progress.

Along with the scientific works directed toward obtaining essentially new results, and working out knotty problems, most important for the perfection of existing technique, there is the constant, everyday need for improvement of

production in industrial establishments.

Technical progress should advance continuously, daily so that technical improvements are introduced promptly, constantly as they are developed. The scientific and factory laboratories play a most important role in insuring such continuous improvement in production. At the present time many enterprises have their own experimental shops and laboratories where intensive research is going on. This factory link with scientific research should receive further expansion during the seven-year plan period.

"The problem of speeding technical progress in industry by all means," said A. B. Aristov in his speech at the 21st Congress of the Communist Party, Soviet Union, "cannot be successfully carried out without a decisive strengthening and expansion of the scientific-technical and experimental basis of the state farms; in enterprises, without drawing closer the educational institutions to life, to production. Consideration is now being given as to how to bring closer to production the scientific and research institutions, the designing and construction organizations."

The problem of insuring a close tie between the development of the three mentioned branches of scientific-technical work — more theoretical research, solution of the difficult technical problems, improving existing technique and insuring the constant perfection of industry directly in the plants — this requires close cooperation and teamwork between the scientific institutions of the Academy of Sciences of the USSR, the Academies of the Union Republics, with the departments and affiliates of the Academy of Sciences of the USSR, with branches of the scientific, designing and construction institutions, the factory laboratories, and the organs of scientific leadership in the plants. It is necessary to eliminate parallelism in the working out of scientific-technical problems, with a careful division of work between the scientific institutions, all working on a unified plan. In the speeches of Comrades Ustinova, Spridonova and other delegates at the 21st Congress, there was considered the need of centralizing the planning of the scientific-research, design and construction bodies. Improving the planning of scientific research, operating on a single plan, the accumulation of clear and timely information on the progress and

results of the work of these institutions on one or another problem, will substantially increase the effectiveness of these research institutions and will insure a more rapid pace of technical progress.

In the solution of the problems of speeding technical progress and increasing its effectiveness, an important role belongs to economic science, strengthening the tie between the economists with technically trained scientists. As a result of the separation in the work of technologists and economists there is often introduced ineffective economic technique. To determine the effectiveness of a new machine or technological process, judgment is often based only on technical indexes, leaving out of consideration the economic results. In many instances obviously inadequate methods are used to determine economic effectiveness, for example, considering only reduction of the number of workers or reducing the labor consumption of a process, calculating the expenditures on wages for the basic production workers, etc.

It is necessary to work out the method of determining the economic effectiveness of new techniques reflecting the economic factors that are related to the production and exploitation of new machinery. A real scientific solution of this problem — this is one of the main tasks of economic science for the seven-year plan. It can only be fulfilled under conditions of close teamwork between economists and technical specialists.

Entering into the epoch of the new great technological revolution, in the era of nuclear technique, automation and chemicalization of production, it is necessary, under conditions of the struggle of two systems, to raise the tempo and quality of scientific research, increase planning, organization, coordination in the development of science, joining the strength of all who labor in science and technology with the aim of the maximum increase in speed of technical progress and the transition to communism.

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Fofanov:

Some Problems in Stimulating Production

and Introducing New Technique*

The June Plenum of the Central Committee of the Communist Party, Soviet Union, reviewed the progress in fulfilling decisions of the 21st Congress regarding the development of new technique, and the composite mechanization and automation of production processes. In order to quicken the tempo of development and introduction of new technique, of first rate importance is the creation of the necessary organizational and economic conditions which would greatly expedite the working out of models of the new technique, hasten the production of machinery, equipment and instruments of newest design, and introduce new technique into branches of the national economy. Of great significance in this connection is the perfection of a system of indexes in the plans of the various enterprises for stimulating the replacement of the obsolete production methods, improving preparation and the material-technical equipment of industry with new technique, and setting forth sufficiently effective economic stimuli for introducing the most progressive equipment and technology.

The socialist system of economy affords the greatest possibilities for introducing new technique and technology in the interests of most rapid development and continuous improvement of the people's well-being. The problem consists in most effectively utilizing these possibilities. However, in this connection we have many serious shortcomings related to the concrete organizational-economic forms. Are all enterprises interested in revamping their production programs, in the replacement of obsolete equipment designed many years ago, with new, more perfected types? Not always, by any means. This is to be explained by a number of organizational-technical and economic reasons. Some managers consider it much easier to produce with equipment that has already been mastered than to learn how to handle new models. Where the technological procedure is long established, the workers and the engineering-technical personnel, on the basis of many years' experience, have learned the technical process to the minutest detail. In these conditions the production goals are fulfilled or overfulfilled with the collective and leading personnel being regularly rewarded for exceeding their production plan and as a result of socialist competition the enterprise is honored for outstanding performance.

The introduction into the factory plan of new production goals often complicates the organization of production and the material-technical means of implementing this new program. The organizational-technical remanufacturing, connected with training, readjustment and the material-technical perfection of the new production methods — this is a difficult and arduous task. Frequently the renovation of production schedules in a plant lowers its technical-economic indexes; plans for volume and quality of production, labor consumption, costs, etc., at first, are often not fulfilled. At the tests of new production processes are not

representation of the problem.

successful; there arises the necessity of eliminating imperfections disclosed by the tests in the already newly regulated technological process. The enterprise is in a furor for a time, during which the collective is deprived of premium pay; other material stimuli also decline. Since 1957 there has been in effect a bonus system for workers for fulfilling and exceeding the production plans in new production plans in new production conditions, which was introduced with the aim of overcoming the before-mentioned difficulties. The way this system works out, it is easier for the enterprise to exceed by several percentages its old plan than to take on the responsibility of the new type production. At times certain plants, such as the Moscow Likhachev, completely fail to use this system.

Thus, new technique designed to assure the growth of labor productivity and lower production costs is considered by certain enterprises as "unsuitable." As a result many plants continue with obsolete production methods. Many plants operate with machinery made in the 30's, 20's and even earlier. Thus the Lipetski sovnarkhoz (Council of National Economy) has in serial production a turret lathe model "1A62" which is represented as a changed and improved model of the "DIP-200" produced in 1925. The Podolsk factory, Kalinin, in the Moscow sovnarkhoz region, has been producing a sewing machine for a number of decades without any substantial changes. Along with this there are examples of extremely slow progress in the designing and production of new technique. Several automatic tool lines were put into operation more than five years after their designing work was begun.

The creation of new technique is not an end in itself; new machinery has obvious advantages over the older machinery. Furthermore, several types of new technique, in their economic effectiveness, technical and productive qualities, not only do not excel, but are even worse than the older machinery in use. There are known instances where the introduction of new automatic lines, hoisting and transport machinery and other new types of equipment, lead to increased cost of products turned out with their use. For example, the cost of saws prepared on a specially made automatic line is twice as high as before automation.

In many instances new and progressive technique is introduced under conditions of production organization where the scale of production does not correspond to the possibilities of high production modern machinery. As a result, it does not pay to use it. At the Vladimir Ilyich plant at the Mosgorsovnarkhoz an installation was built for the coloring of parts in a magnetic pole. Experience showed that with the given volume of production the installation can be utilized altogether 1-1.5 hours per day and is, therefore, unprofitable. The installation was dismantled and moved to another location. The loss in carrying out this project ran into several hundred thousand rubles.

These examples testify to the serious deficiencies in the renovation projects, in the introduction of new machinery

and perfection of technology. It is not surprising that such "new technique" does not show the way forward. The task remains of creating such organizational conditions and material incentives in the design-construction work which would stimulate to the maximum the development of the most effective course toward technical progress.

In recent years our builders, technologists and engineering-technical workers have devoted increasing attention to the preliminary economic planning for new technique. Well-known successes were had in working out the methods for determining the economic effectiveness of new technique. There has accumulated considerable experience of concrete accounts of the economic effectiveness of new technique in *sovnarkhozes*, in designing, scientific-research organizations and in enterprises. The scientifically-based method for determining the economic effectiveness of planned machinery and technology, eliminates the possibility of creating insufficiently effective types of new technique and creates more favorable conditions for introducing really new technique.

Our scientists-economists should help the *sovnarkhoz* and enterprises in working out a sufficiently simple and dependable method of determining the economic effectiveness of new technique. It is necessary, first of all, to find a simplified yet sufficiently accurate method of calculating the cost of production when using new machinery and advanced technique. Calculation of economic effects is a very difficult operation.

Of considerable importance to the stimulation of new technique is the establishment of technical-economic indexes of the production plans — the volume of production, labor consumption, costs and accumulation. In the planning it is necessary to interest the enterprise in the mastery of new production methods. There should be included in the production program of new articles plans for the equivalent reduction in cost of the older production. This should be established as a rule in calculating production costs. In the first period of the introduction of new production it is necessary to set up incentive indexes so as to give the collective a material self interest in making it effective. In setting these technical-economic indexes for the older production (labor consumption, costs, etc.), they should be set at such a level as to discourage the use of older methods in favor of newer ones.

Of importance in accelerating the tempo of technical progress is the correct setting of prices on new production so as to stimulate their increased output in existing plants and their introduction into consumer industries. The prevailing practice of including in the production price all expenses entailed in putting out articles based on new technique is retarding the technical re-equipment of our national economy. Prices are unjustifiably raised and the consumer is forced to forego such high-priced goods. Thus, for example, a new four-positioned automatic molding machine prepared by the plant "Krasnaya Presnya," *Mosgorsovnarkhoz*, was for a long time not put into production since there was included in its price all expenses in putting out a new model, and the price was set at 350,000 rubles.

On the other hand, the setting of prices of new products on the same level as the earlier production will result in losses for the plant introducing these new methods. We can cite the following example. At the Vladimir Ilyich plant there was produced a new washing machine. The first group of machines cost the factory about 3,000 rubles each. However, the price set, based on the price level of plants where this product has been long in production, was only 1,500 rubles.

The soundest basis for price fixing on new production

which would attract the consumer, is to fix prices at a uniform level as set by plants where this article is already in production, with, however, corrections for the higher quality indexes of the new product. However, to avoid financial difficulties during the period when the new product is being introduced, certain budgetary adjustments need to be made to compensate for losses entailed in the introduction of new products. In the final analysis, the government will not suffer any losses, since at the present time it is necessary to find one or another way of overcoming the losses sustained by enterprises in introducing new production. In the long run, the introduction of new technique will result in sufficient accumulation of income on a national scale, since new technique will result in increasing labor productivity and lowering of production costs.

A most important factor in speeding technical progress is to stimulate the perfection of more effective models of the new technique, by material incentives to designers for the more rapid creation of highly economic models of machines and equipment. In the machine building industry since 1956 favorable conditions exist for the output of new technique, since provisions are made for material rewards to designers, technologists and other workers. The premiums for the production of new machines, equipment, mechanisms, instruments, apparatus and materials is set at 5% to 30% of the annual economic effect that will be attained by the introduction of new production methods. The amount of premium for the working out and introduction of progressive technological processes and production methods as well as for carrying through mechanization of labor is determined for serial production up to about 15%, and for individual production to 30% of the annual economic effect. In both cases the premium is paid upon completion of work within a given period. With the aim of increasing the self-interest of scientists, designers, technologists, plant leaders, workers and others towards the more rapid mastery of new production methods, premiums are paid for different levels of work fulfillment, with the main portion of the premium being paid at the final stage.

Nearly three years of experience with this method confirmed its effectiveness and advantages as compared with many previous incentive systems. We can cite a number of examples. The workers at the Kirovograd plant "Krasnaya Zvezda" and the All-Union Scientific Research Institute of Agricultural Machine Building (VISKHOM) carried through the modernization of the square-sowing seeding machine "SKGK-6." The new construction has reduced the operating personnel by 5. The annual saving from this reduction amounted to 18 million rubles. Those participating in working out this new seeding machine received 720,000 rubles in premiums. The designing institute of the former Ministry for Light Industry of the USSR in 1955 worked out a special device for making cord for automobiles with a resulting saving for the government of 1 billion rubles a year. By the end of 1956, for various reasons, the production of this device has not yet begun. After the introduction of the new premium system, it became possible to put this device into production by May 1957. In 1958, within a period of several months, a number of plants in agricultural machine building, "Rostselmash," "Communard," Tagansk "Aksaikardantel," the Vinnitsa assembly plant and others started production of the self-propelled combine "SK-3," the construction of which was worked out at the Scientific-Research Institute of Agricultural Machinery Technology and the State Special Designing Bureau for seed combines. The general saving for the national economy as a result of the use of this new combine is estimated at about 125 million rubles yearly.

However, as life has shown, this incentive system, and particularly its application, suffers from serious defects. Particularly, it fails to assure compensation to the main creators of the new technology; premiums are distributed in small amounts to workers, many of whom do not take part in the development of this new technique. The direct participants in the working out and introduction of new technique — designers, technologists and shop workers — frequently receive lower premiums than the administrative staff. Thus at the Kharkov tractor plant the average premium paid out for development and introduction of new technique during 1957 and the first half of 1958 amounted to, for leading workers, on the average 4,000 rubles and for designers and technologists, altogether, 300 rubles. In the Malysheva transport machinery plant during the same period, the premiums of the administrative staff averaged more than 3,200 rubles while the engineering-technical staff got 380 rubles. Such a situation cannot be considered as normal.

The existing incentive system does not take into account the differences between establishments in terms of scale and type of production. The mass production and serial production establishments are in a more favorable situation with regard to the amount of premium than the individual and small-scale producers. At times the workers in a plant do not even know the kind of work covered by premiums and the amount of premium to be paid for fulfillment of a given task within the established period. The concept described above, of basing premiums on the fulfillment of certain levels of work, is violated. As a result, the stimulating effect of the premium system is to a considerable extent undermined, since after a lapse of time the worker forgets what kind of work he has accomplished and what premiums he is entitled to. It is obvious that the first condition for the effective operation of the premium system is for the workers who create the new technique to be informed as to the conditions under which premiums will be paid. Unfortunately, this is rare. Thus the Moscow city sovnrarkhoz and the Leningrad sovnrarkhoz only in June 1958 established a definite procedure for working out and introducing new technique with enumeration of premium payment to the participants. This situation has continued to exist in 1959. Thus the Moscow city sovnrarkhoz established a procedure for 1959 only last May.

In order to fully take advantage of such an effective method for stimulating new technology as the premium system, it is necessary to critically examine the existing situation with the aim of establishing this system in all branches of industry (and not only in machine building), and to eliminate the shortcomings of the present system. In particular, it would be worth considering the granting of bonuses to specific engineer-technical workers in sovnrarkhozes who actively take part in the creation and introduction of new technique. In carrying through many technical undertakings in the machine building enterprises, there take part scores of planning, designing and scientific-research organizations, and suppliers of various aggregates, articles, new materials, etc. In this connection it is important to establish a proper coordination of all this activity so that all participants may simultaneously fulfill their tasks. Such organizing work is being done by specialists of the sovnrarkhoz, leading engineers and others. In our opinion they should receive premiums for carrying out important assignments in working out and introducing new technique.

It is important to note the specially stimulating effect on the introduction of new technique by the use of control tasks or fulfilling the production program. This is especially important for development of progressive types of rolling

mills and production of heavy machinery in which at the present time the volume of production is measured in tons or in monetary terms. Thus, we know of the inadequacies of the existing system of setting goals according to the number of tons produced in the metallurgical industry. Such a system does not stimulate the output of rolled metal, forgings, castings with low specific weight indexes with low allowances for metal working. This has an importance for the economizing of metal consumption. Planning the volume of production in tons does not stimulate the expansion of the assortment of rolled products, especially the lighter and shaped profiles and other types of progressive materials, whose production is seriously lagging. We should remember that in many foreign countries, there are produced thousands of types of profiles with greatly varying dimensions, giving the designers a wide range of choice in selecting the most suitable parts for machine designing. Due to our limited assortment of rolled products, the designers are often forced to lower the index of performance of materials designed by these machines. It makes the designing work more difficult, increases the expenditure of metal as well as the production of these machines. It does not stimulate the struggle of the designing and construction organizations for the reduction of the weight of materials produced and to economize on metal.

The use of a correct system of measuring the volume of production plays an important role in improving quality and in extending the variety in production. Let us take an example from experience in the textile industry. Up until recently the output of fabric was planned in running meters. This did not contribute toward increasing the assortment of cloths, particularly according to sizes. The changeover toward planning the work of textile enterprises on the basis of new indexes (in square meters), sharply changed the situation. It substantially extended the assortment of articles, gearing the output of different types of fabric on a much wider basis.

Similar measures should be taken in other branches of industry, particularly in metallurgy and heavy machine building. The volume of production should be planned on the basis of natural measurements for each type of product, which undoubtedly would lead to a considerable economy of materials, and improve the quality and weight indexes of the products as well as widen the assortment.

For quickening the tempo of technological progress, the most important problem today is to eliminate production with obsolete equipment. The elimination of several types of obsolete techniques would have a most favorable effect on many types of the same product made in different enterprises. Many such products often do not enter into the production nomenclature of the Gosplan of the USSR or in the plans of the various Republics. The output of such articles is therefore carried out without the needed control and coordination, which creates the possibility of parallel output by a number of enterprises of several types of the same product (for example, pumps, electric motors, tools, armatures), which are produced in different plants with entirely different technical levels and therefore with different qualitative characteristics. Let's take some examples. At the Kiev automation plant there is produced a six-spindle automatic machine model "1261M" and at the Moscow machine tool plant Ordzhonikidze, a similar machine tool model "1240-6" is being produced. Both tools have about the same dimensions and differ only slightly in design. But while the tool produced at Kiev costs 41,600 rubles, the one at Moscow costs 102,780 rubles or nearly 2.5 times as much, in spite of the fact that there is no significant difference between them.

With the aim of stimulating the output of really new technique, to popularize the best models and to expose the backward types of industrial production, one of the means of achieving this would be to organize every year an exhibition of all similarly typed products manufactured, such as machine tools, pumps, electric motors, etc. Such an exhibition would make possible a visual comparison of the quality of these products and the timely elimination of obsolete articles.

It is also necessary to consider the following important question — how to stimulate the scientific-research, designing and testing work in the creation of new technique. The present system of specialized planning institutes, designing bureaus and other organizations who plan and work out new technique apart from the plants where there is to be organized the serial production of new articles, does not help reduce the lag in introduction of new technique. Under this system, the experimental models require as a rule considerable finishing and adjustment before they can be put into serial production, which prolongs the period of mastery of new technology. Thus there is a growing recognition of the need for organizing within the enterprises planning and design and testing divisions which take on the responsibility of planning and testing and finishing the models created on the basis of new technique. These planning organizations should be equipped with a corresponding production base and laboratories for the conduct of the necessary scientific research and testing work.

At the same time there is need to solve the problem of those planning organizations which are situated in the area of the corresponding enterprise, but are not subordinate to it. These planning organizations suffer from the above mentioned deficiencies of independent scientific-research organizations. In our opinion these planning organizations should become an organic part of the corresponding industrial enterprise, and where necessary should be given the function as the leading planning organization of the given branch of industry.

The proposed reorganization of scientific-research and planning work should take place at the same time as other measures are being taken for increasing the self-interest of enterprises in the creation and introduction of new technique. In some circles there is a fear that the subordination of these independent planning organizations to the enterprise in their area will endanger the execution of the large scale research in the development of new technique. These fears are based on the premise that at the present time the heads of enterprises are primarily concerned with carrying

out their plans for serial production on the basis of existing production methods and thus center all their attention on current production goals. The realization of the above outlined propositions for the perfection of planning and stimulation of production will eliminate this abnormal situation and will assure the self-interest of directors of enterprises in the performance by the subordinate scientific-research and planning institutions of the long range problems of technological progress.

We have examined only some specific factors, contributing to the development of new technique, and these, of course, do not exhaust all stimuli which could be used for speeding the development of technology. Thus, we did not concern ourselves with such stimulating factors as the regulation of wages for specialists and the elimination of serious inadequacies in wages for some of these categories, questions related to methods for collective incentives in establishments, questions of specialization in plants, the procedure for financing work based on new technique, the problem of unification and typification of parts, particular assemblies and the machinery, as well as the technological process. A great stimulating role is also played by the regulation of the system of confirming planning goals, the rules for testing and accepting models of new technology, and their inclusion in plans for serial production.

It is necessary to fully utilize all stimulating factors with the aims of speeding the development and mastery of new technique, the introduction of which will have a profound economic effect. Thus in machine building in 1959-1965, the general economic effect as a result of the introduction of specialized machine tools only, according to present calculations, should consist of about 14 billion rubles. Calculations show that the general effect of the planned modernization of machine tools for 1959-1965, will come close to 2.8 billion rubles. The realization of the contemplated measures for the introduction of modern methods of welding will result, in the seven-year period, in a 20-million ruble saving. The general economic effects from the introduction of continuous production lines for 1959-1965 are approximately 3.5 billion rubles with expenditures on their organization of about 0.7 billion rubles.

The speedy mastery and wide application of new technique in all branches of the national economy will have a profound significance for the rapid realization of the historic decisions of the 21st Congress of the Communist Party of the Soviet Union for the creation of the material-technological basis for communism in our land.

N. Lebedinsky:

Decisive Conditions for the Fulfillment of the Seven-Year Plan

The further rise in the economic potential of our country and the people's living standards should be sought for mainly through the increase in labor productivity. During the seven-year plan the productivity of labor in industry will grow by 45-50%, in construction by 60-65%, railway transport by 34-37%, on the sovnarkhozes by 60-65% and on the collective farms it will just about double. In view of the projected control figures for shortening the work day and work week, the hourly increase in labor productivity should reach an even higher figure.

On the basis of the increased productivity of social labor and the maximum mobilization of internal resources in all fields of our national economy for the seven-year plan, the production costs in industry, transport, construction and in sovnarkhozes will decline by some 850 billion rubles. This sum is about 45% of the government capital outlay for the execution of the seven-year plan. Without such a reduction in cost it would be impossible to carry out the projected plan for capital construction.

The decisive condition for the growth of labor productivity under socialism is through the increase in technical equipment, improved organization, the concrete expression of which is the composite mechanization and automation of productive processes, perfection of technology and widely developed industrial specialization.

In the years of Soviet power our land has achieved great successes in improving the technical equipment of labor in all branches of the economy. The productivity of labor in industry has increased tenfold in comparison with 1913 and its electrical equipment more than 20 times. These figures testify to the vast scale of work in the basic technical reequipment of industry.

In many branches of the national economy the specific weight of mechanization of basic processes has reached 100%. Thus in mining the work of cutting, sorting, cleaning and loading coal into railway cars has been fully mechanized. In the lumber industry the level of mechanization of rolling, supplying and transporting the timber to the large wood-processing establishments has reached over 90%. Plowing, sowing and harvesting on the state farms are 99-100% mechanized and in the entire national agriculture, including collective farms, the level of mechanization of these operations has reached 90-98%. In construction the level of mechanization of the heaviest and hardest work has reached 95%.

In recent years there has taken place an ever greater use of automation. Many of the technological processes in ferrous and non-ferrous metallurgy, in oil refining and various branches of the food industry, are automatically controlled according to a prescribed regime. A high level of automation has been attained in the thermoelectric stations where control of the combustion process has been automated up to 83%. The hydroelectric stations are almost fully automated, and nearly half of them are not telecontrolled.

In the Kazakhstan state farms tests are presently being made with tractors equipped with automatic devices invented by the tractor driver I. G. Godinov, of the virgin soil state

farm "Irtyshskii." This invention opens broad new perspectives for technical progress in agriculture. This signifies the introduction of automatic and telemechanic equipment into an entirely new field — into agricultural production. The application of automatic technique in agriculture will lead to a sharp increase in labor productivity in one of the most labor consuming branches of our economy, and will hasten the transformation of collective and state farm labor into a form of industrial labor on the basis of new technique.

The technical re-equipment of our national economy is based on the primary development of heavy industry and its control core, machine building. The quantity and structure of production in machine building determines in a decisive manner the tempo and direction of technical progress in all branches of production. The output of the machine building and metal working industries has increased 240 times as compared to the pre-revolutionary period. The supply of metal cutting tools consisted in 1913 of less than 100,000 and at the present time is close to two million units, while the supply of forge-press machinery rose from 18,000 to nearly 400,000. In the machine building enterprises there now operate hundreds of automatic lines which are turning out equipment for the first automated plants. Our machine building industry at the present time turns out daily 80% of the annual production of the machine building, metal cutting industry of Czarist Russia.

One rolling mill "2500," now being produced at Novo-Kramatorski Plant, will turn out more rolled metal than the entire pre-revolutionary metallurgical industry. The capacity of 5-6 turbines produced by the Leningrad Metallurgical Works "Lenin," exceeds the power of all Czarist electric power stations. The modern excavator replaces 7 to 8 thousand ditch diggers, which is still far from reaching the limit of the possibilities of excavating machinery. In its productivity, power and durability, our native equipment and machinery, as a rule, compares with the best of foreign lands and in many instances excels the best foreign models. Our machinery is meeting with growing demand abroad.

The tempo of technical progress in enterprises depends to a large extent on the activity of the plant leaders, engineering-technical personnel and workers. Particularly favorable conditions for unfolding the initiative of large sections of our working people will be created as a result of the new direction, set in 1957, for the rebuilding of our industry and construction work.

In the enterprises of socialist industry, transport and construction there are being systematically realized measures for the perfection of technological processes, mechanization and automation of specific branches resulting in important economies for relatively small capital outlays. As to the nature and economic effectiveness of this work which is daily being carried out in tens and hundreds of enterprises in different fields, we can judge from the following facts, taken from practical experience from a number of enterprises in recent years. It should be stressed that these enterprises are by no means exceptional in regard to their tempo of technical progress. The examples cited below

indicate the general tendencies and results of technical progress attained in the majority of socialist enterprises.

During the past three years the Urals aluminum works has introduced a number of different technical improvements, rationalizing methods and inventions which raised the level of mechanization and extended automation into the process of production of aluminum oxide and aluminum. Thus, in the wet grinding division there was automated the loading of milled bauxite, the measuring of revolving solutions, shifting the flow of sand with a classifier, controlling the pressure before the hydrocyclone and controlling and regulating the temperature of the bearing. All equipment for automatic control, regulation and communication is concentrated in one place and mounted on a central control panel. The savings effected by the plant through such a composite technical improvement (with the resulting increase of productivity, release of labor and material economies) consisted of 236,000 rubles per year. In the production of aluminum oxide in 1957-1958 work was also completed on the automation of the pumps, distribution of the aluminum mix, automation of the supply of mazut, etc. The over-all annual savings resulting from the many measures taken to perfect the production of aluminum oxide amount to 519,000 rubles, with a capital outlay of 1,063,000 rubles. Automation of the continuous leaching division is to be completed in 1960 and will result in additional savings of 600,000 rubles with a capital outlay of 700,000 rubles (hence these expenditures will be paid off in a few years).

The plant worked out a plan which was presented to the Sverdlovsk sovnrarkhoz for study, calling for the further automation in the production of aluminum oxide in 1959-1960. The execution of this plan, calling for an outlay of 1.1 million rubles for the purchase and installation of equipment, will make it possible to eliminate 74 workers. Furthermore, the increased productivity of the new equipment and reduced expenditures of electric and steam power will result in an economy of 4.9 million rubles.

The significance of automatic control and regulation of the aluminum industry is not only in its economic effects; in view of the health hazards characteristic of this industry, the most important effect will be in making the work easier and more healthful. The plant has already perfected plans for the automatic regulation of the electrolysis process and expects to automate all the aluminum electrolysis baths. Plans have been worked out and partially put into effect for the composite mechanization of the electrolysis operations with the simultaneous introduction of new technique for processing electrolyzers. After the completion of these measures the Ural aluminum works will become fully automated and mechanized, eliminating 250 workers with an annual saving of 8,800,000 rubles at a capital expenditure for the purchase and installation of equipment of 7,400,000 rubles.

Let us consider an enterprise with a different character and technological cycle, the Balkhashki mining-metallurgical combine. The energies of the administrative staff, engineers and worker-rationalizers have been directed toward raising the mechanical level of production and the introduction of automation, which made it possible in recent years to substantially raise the productivity of the existing equipment, to increase output over the existing production levels, to reduce the number of manual workers, cut the consumption of materials and electric power and improve working and safety conditions.

A typical example is provided by the Balkhzheski crushing combine. During the past five years the plant has carried through a number of measures to automate the equipment. As of the first quarter of 1959 there were set up 104

automatic installations and controls, with central control panels for heavy, medium and light crushing. The plant set up automatic regulation of conveyor belts and automatic protective devices against breakdown of conveyor belts, apparatus for automatic control of the pumps, automatic lubrication of the mechanism, automatic brake control of conveyors and other automated machinery.

As a result of the many automatic installations there has taken place a considerable improvement in the technical-economic indexes of this plant. The labor force in 1958 was 55% smaller than in 1953, the amount of ore processed per worker 213%, the processing costs 62%, expenses for the conveyor belt 35%.

At the Balkhashskov copper smelting combine there has been established in recent years a central control of the charging operations, the preparation of fluxes has been mechanized, the fuel regime of the reverberating furnaces automated. There was also introduced automatic control of the dust and exhaust pumps, apparatus for automatic protection of the air-blast machinery, and automatic regulation of the pumps. The general savings as a result of these measures exceeded 2 million rubles.

All mechanization and automation work at the Balkhashsk combine has been carried out mainly with its own resources. This fact, in light of the above-mentioned data as to the economic effects of these measures, speaks for itself. It testifies to the inexhaustible inner resources for raising the technological level of production, which are to be found in every plant and which can be utilized, depending primarily on the initiative of the entire collective and its leadership. At the same time one should not overlook the negative aspects of such a procedure where resources for designing and preparing the automation and mechanization equipment are drawn from the enterprises where they are being installed. Undoubtedly, the composite mechanization and automation of industry will advance at the most rapid pace and will yield the highest economic effect only when the machine and tool building industry will set in motion highly specialized mass production of such machinery, mechanisms and apparatus which are needed for the composite mechanization of nearly all branches and processes of production and such instruments which are standard typical elements of all automatic installations. Thus we speak of mechanized instruments, means for mechanization of loading and unloading of transport work, of various data computing units which are basic elements in electric and radio-electronic systems of automatic control and direction, etc.

It is recognized that the best effects are achieved under those conditions where mechanization and automation is accompanied by an improvement or basic renovation of technology. Experience has shown that attempts at automation of industrial processes on the basis of the technology used under conditions when non-automated equipment was employed, does not give the desired effect, and in some instances the cost of production with such automation even rises as compared with the previous production methods. On the other hand, in designing new technology, it should be calculated on the use of modern methods of composite automation and mechanization. It should be noted that many technological processes cannot be technically realized without full automation. A classical example is that of atomic power. Similar processes are to be found in many branches of industry, although, as a rule, they are far from being as complex as the process of releasing nuclear energy. For example:

At the Novo-Ifimsk oil refinery until recently there was a wasteful burning of a large quantity of gas. The problem

consisted in utilizing this valuable fuel in electric power stations. The main technological difficulty consisted in this — that the pressure and the lines of the jet gas were insufficient and unstable and that it was necessary to stabilize them and bring them up to a given level. To accomplish this aim it was found necessary to install in the pipe lines automatic regulation of pressure and special valves with electronic remote control, thus assuring the proper regulation of the gas supplied to each boiler of the electric power station. Only on this basis was it possible, after installation of the automatic apparatus, to solve a seemingly simple problem — utilizing the gas for generation of electric power. The economic effect of this measure can be expressed by the following figures: cost of the automatic apparatus 100,000 rubles, while the annual saving exceeded 2.5 million rubles.

As we evaluate our achievements in improving the technical equipment of our industry, we should not forget that in many enterprises and even in entire branches of industry the situation is far from satisfactory in this regard. It will still take a great deal of effort before we can reach and surpass the labor productivity of the USA which in industry is 2-2.5 times greater than ours, with the gap being even wider in agriculture.

In machine building in the USSR the specific weight of manual labor is about half of all labor expenditure. About the same situation exists in woodworking. There is a high percentage of manual labor in mining and many other industries. This is largely to be explained by the fact that our main energies thus far went into the mechanization and automation of the basic technological processes where relatively high indexes were attained, while the auxiliary operations received much less attention. Therefore in the auxiliary sector of industry the proportion of workers is much higher — consisting of nearly half. Only in the loading and unloading and transport work in industry there are employed about 2.5 million persons and in repair shops and establishments more than 2 million. In the machine building industry more than half a million workers are employed in inner plant transport (moving materials, products, waste). In harvesting and other types of heavy non-industrial labor only 20% of the workers use machinery, while the work of the others is entirely non-mechanized. Nearly a million workers are occupied in entirely nonproductive labor in departments of technical control. Automation of control operations and the development of centralized preparation of instruments and technological equipment in modern, specialized plants would help to release many hundreds of thousands of persons and tens of thousands of machine tools for use in basic industry.

Considering the fact that in the professions mechanization is very weak or entirely absent (let alone many other examples that could be cited), it is sufficiently clear that there is still an enormous field for further mechanization. Even wider horizons open up for automation. Here, in fact, only the first steps have been taken, with the main battle still to be fought during the coming seven-year plan.

As already indicated, the scale and tempo of mechanization and automation are being retarded by the failure to produce sufficient numbers of certain types of machinery, mechanisms and automatic devices. For all the varied nomenclature of the machine building production and the imposing scale of its output, it still fails to meet the demand for automation and mechanization. The output of mechanized instruments as well as loaders, power trucks, cranes, lifting equipment is still inadequate: the types of these mechanisms are still very restricted. The situation is

particularly bad in the field of installations for continuous transport. There is, as yet, no centralized, specialized production of conveyors. The enterprise needing them is forced to build them with its own resources. It is not surprising that such conveyors are very expensive and their technical qualities quite low. In our plants and factories we still don't have automated propelled conveyors with address distribution of the transporting article — which have long been in use abroad.

There is a serious shortage of various types of data units, performing mechanisms and starter-regulating apparatus. There has been little growth in the production of many types of instruments, particularly transmission level meters, contactless separators, devices for measuring viscous mediums and loose materials, as well as instruments whose action is based on the properties of bimetallic films. For several years the production base for making instruments and equipment for automation has lagged behind the needs of our national economy. Further, even in instrument building technical progress has been insufficient. A large part of the new designs of instruments and apparatus worked out by the scientific-research institutions are not brought into the instrument producing plants for long periods of time. Thus, of 117 types of instruments worked out by the chief designing bureau in the field of pyrometers during 1956-1958, only 37 have been put into production, and even these have in many instances been produced on a small scale.

With mechanization and automation there is an ever increasing demand for electro-mechanical articles, especially low voltage apparatus, cables and electric motors (especially low power motors). Unfortunately, these requirements are being met on a very limited scale, which is due to the restricted scope of its production base.

Very considerable effort on the part of the scientific-research institutions and designing bureaus has gone into the solution of the problems of automation and mechanization of industrial processes. If the work of only one institution — the Institute of Automatics and Telemechanics of the Academy of Science of the USSR — had been carried into life on a large scale, it would have resulted in very large savings for our government during the seven-year plan and would have released tens of thousands of workers and administrative personnel for use in other fields. We shall cite a few examples of the work of this institute.

In 1958 the Institute for Automatics and Telemechanics together with the Designing Bureau for Automation and Mechanization of the Petroleum and Gas Industry introduced automation in a number of petroleum enterprises. Experiments in the exploitation of automated wells showed that if during the seven-year plan automation were extended to 70% of all wells in the USSR this would permit the elimination of 23,000 persons and the general savings would come to about 1 billion rubles.

In ferrous metallurgy the above Institute, together with the Central Laboratory for Automation in the Construction Ministry of the RSFSR, and several other organizations conducted work for increasing precision of rolling mills. On the thin-sheet rolling mill "1450" of the Magnitogorsk metal combine, it is planned to carry through this year industrial tests of a system of automatic stabilization of heating temperature of metals in automatically built cages. The use of this system would permit a twofold lowering of the average permissible thickness of sheet with a lengthening of strip by 4%. For one thin-sheet rolling mill this would permit a 50,000-ton increase of rolled metal without increasing the expenditure of iron or steel. The introduction of this automatic system in all thin-sheet rolling mills would result in an annual saving of several hundred

thousand tons of metal.

Many valuable instruments, apparatus and methods for automatic regulation have been worked out by other scientific-research and designing organizations, working in the field of automation and instrument building. However, the problems of automation and mechanization in this seven-year plan are so great that the existing scientific-research base cannot fully assure their solution. It will be necessary to take much more energetic measures. A no less important matter is the regulation and coordination of the scientific-research and designing activities so as to improve their quality and effectiveness. It is known that due to the lack of close coordination there often occurs duplication of effort. The scientific-research organizations and designing bureaus do not sufficiently utilize the latest achievements in physics, chemistry, electronics and cybernetics in working out new automation and mechanization methods. One of the main directions for improving the organization of scientific-research work should be the formation of leading institutes which would coordinate and would assure a united technical policy. The main role in giving direction to the scientific-research activity in different branches of industry falls on the Government Scientific Research Committee and the recently created Committee of the USSR Council of Ministers, for Automation and Machine Building.

In the control figures for 1959-1965 there is envisioned a considerable stepping up of the tempo of development of branches of machine building so as to provide the national economy with the most important types of mechanization and automation. It is expected that the output of instruments will reach 18.5-19.2 billion rubles, which means a 2.5-2.6-fold growth during the seven-year period; this includes the output of mathematical calculating machines, which should increase 4.5-4.7 times. The output of low voltage apparatus at the end of the seven-year period will exceed its 1958 level by 5.2 times. There will take place a sharp increase in hoisting-transport and loading-unloading equipment.

The machine building industry itself should experience a notable rise in its technical level. During the seven-year period it will receive over 1,100,000 new high production metal cutting machines, which will make it possible to take out of production over 600,000 worn out and obsolete machine tools and will bring up the tool reserve to 2,500,000 units. Among the most advanced types of equipment to be introduced into machine building plants during the seven-year period, there will be 1300 automated and semi-automated lines. There will be a substantial growth in the reserve of forge-press machinery and in the first place, on account of the automated forge presses, mechanical presses and forging machines.

All this will basically strengthen and widen the material-technical basis for mechanization and automation. It would however be incorrect to assume that the achievement of the control tasks set for the means of mechanization and automation will permit the full solution of all problems in this field. The more rapid tempo of technical progress highlights the importance of more rapidly increasing the facilities for mechanization and automation and the task before the scientists and technicians is to guarantee the attainment of these control tasks ahead of time.

The rapid increase in the production of machinery, equipment and apparatus used in composite mechanization and automation should be accompanied by a qualitative leap in the character of the technique and technological processes in the field where it is being used. Only then will it

be possible to achieve an upsurge in the productivity of labor which can be measured not in single or ten percentages but in hundreds and thousands of percentages.

It is generally recognized that the transition from underground digging to open operations with the help of modern multi-cubic excavators, terrace bridges, earth pumps and similar techniques will result in a 5-6-fold rise in labor productivity and lower costs 3-4 times. But such a transition to basically new technology is possible only as a result of a sharp change in the design, power and productivity of the suction dredge machinery. Every time we find a many-fold rise in labor productivity, we also find that it is achieved by sharp changes in the technological processes as well as in technical equipment.

One of the important directions for technical progress in the seven-year plan period, which will lead to a sharp rise in labor productivity, is the extensive replacement of the old methods with continuous production processes. Of special interest in this connection is the so-called rotor automatic line, worked out by a group of designers headed by L. N. Koshkin. This line differs from all the other automatic lines in that it is able to handle various operations of entirely different character and duration, with the production of articles taking place in the course of their movement. The productivity of rotor lines is immense and to a certain extent is not dependent on the time required for the production of separate parts. It should be stressed that the principles on which the rotor lines are based and which are not used in machine building, can be applied in many branches of production, particularly in the production of plastic articles, rubber, etc. There is need for drastic measures speeding the production and wide application of these lines. Available data point to the fact that the cost of rotor lines is much lower than the usual automatic lines and their productivity many times greater.

Important results can be obtained from the use of a system of self-regulating and automatic direction of technological processes. The direction is determined by objective data placed in electronic computing machines and does not depend on the qualifications of the operator. These systems are being applied, in the seven-year plan period, mainly in the chemical, petroleum and related industries where the technical regime is continuous and where its optimum operation depends on many different and complex factors. In the direction of such processes even a qualified operator is unable to grasp quickly enough the instrument readings, the changes in the technological operations and to make decisions which would immediately eliminate, much less foresee, undesirable deviations from the optimum regime. Such problems can only be handled with the help of quick-acting electronic calculating machines which receive information in the course of operations, quickly evaluate these data and if necessary give orders for changing one or another parameter of the technological process. It should be noted that certain thermochemical and similar productive processes are not sufficiently understood so as to enable the operator to know in advance its optimum regime. In such instances the cybernetic regulating systems are not only able to maintain a given operating regime but also to improve it on the basis of experience accumulated in operating certain equipment.

The introduction of automatic equipment for the active control of quality not only replaces a whole army of inspectors but in general precludes the possibility of spoilage.

Automatic electronic calculating and informational technique should also find wide use in planning, estimating and administration. These functions at the present time occupy

more than 2 million persons. Automatic calculating-planning work considerably eases and improves the effectiveness of the work of economists, statisticians and administrators and will release hundreds of thousands of qualified people for work on production.

The greater the development of mechanization and automation of the production process, the more important becomes the question of the reliability of the machinery. If in the previous stage of machine production the breakdown of some machinery did not have any important effect on the productive process, now when the individual machines and assemblies are united in a complex interconnection of the automatic system, a defect in one of the machines can lead to the interruption of the entire section of production with serious consequences. To eliminate these consequences from possible breakdowns, enterprises must establish serious protective methods and maintain additional personnel for control of the automatic apparatus and instruments. Increasing the reliability of equipment under present conditions of automation is one of the most important technico-economic problems, deserving the most serious attention of scientific-designing organizations.

The speedy fulfillment of the task of composite mechanization and automation of production processes, set by the 21st Congress of the Communist Party, depends to a large extent on the organization of the work.

There is a growing recognition of the need to regulate certain problems of planning and material-technical measures to assure automation and mechanization. At the present time plans for mechanization and automation are worked out in the Union Republics and consequently are not always supported with the fullest resources needed for their execution. In our opinion, the more important measures for mechanization and automation should be included in the annual national production plans, which would better insure the needed financial support as well as material and equipment for their implementation.

At the same time it is necessary to increase the responsibility of local organs for executing the most important tasks for the introduction of new technique.

In addition to the perfection of planning it is necessary to raise the material self-interest of the collective and leadership of the enterprises in the introduction of composite mechanization and automation, since at the present time many undertakings which are actively engaged in this work

often find themselves in a less favorable position than enterprises where the leadership follows a more conservative policy.

It is important to work out the scientific basis for the methods of determining the economic effectiveness of mechanization and automation. In view of the lag in scientific work in this field in practice there arise considerable difficulties in determining the expediency and priority for taking certain measures for composite mechanization and automation and in selecting the most important direction of the work, requiring the concentration of the energies of the scientific personnel, designers and production workers. The economic effectiveness of mechanization and automation should be determined from the standpoint of the entire national economy and not only from the viewpoint of the economic position of the enterprise where one or another measure is being applied. Special attention should be given to methods for determining the desirability of capital expenditures with an evaluation of the previous labor costs. Indexes showing the number of workers released and the savings from current expenditures flowing from mechanization and automation, without taking into account the amount of social labor incorporated into this new machinery, do not give the full picture as to the economic effectiveness of one or another measure.

An important role in speeding the tempo of technical progress is played by the popularization of the outstanding experiences and important information about achievements in the development of new technique. The 21st Congress of the Communist Party decided to set up no less than 50 experimental-demonstration enterprises which can serve as models for the levels of technical equipment and organization of labor. It is necessary to quickly solve the problem as to which branch of industry and which particular enterprise should be selected to serve as models and to proceed rapidly to the task of re-equipping them so that the accumulation of the latest experience of these plants could be widely utilized in the present seven-year plan period.

The discussion of the June (1959) Plenum of the Central Committee of the Communist Party of the Soviet Union on the basic problems of technical progress will further strengthen the work of automation and mechanization, will assure an even more rapid growth in the productivity of social labor and will bring closer the time for building the material-technical basis for communism.

G. Anisimov:

Raising the Workers' Material Self-Interest in the Introduction of New Technique

In order to carry out the grandiose tasks set forth in the seven-year plan the introduction of new technique is of foremost importance. Tens of thousands of new machine tools, various types of new equipment will be perfected and introduced into our national economy during the seven-year plan period, with a sharp rise in the level of automation and mechanization of industry. These measures will result in vast savings for our national economy running into many billions of rubles.

The tempo of technical progress will be determined to a large extent by the correct organization of the material incentives of the workers in the creation and introduction of new technique. As is well known, not all workers in our national economy equally participate in advancing technical progress. Therefore it is necessary to take such additional measures of material stimulation which would take into consideration the various levels of participation in the introduction of new technique.

One of the most important conditions for strengthening the material self-interest of workers in technical progress is the perfection of a system of material rewards for innovators. The system in existence up until the time of World War II contributed considerably to stimulating the initiative of the workers. The number of inventors and rationalizers in our country increased from 526,000 in 1940 to 1,725,000 in 1958, while the number of inventions, technical improvements and rationalizing suggestions rose from 202,000 to 1,816,000. The economies effected through the introduction of these inventions and rationalizing suggestions in 1958 amounted to 9,721 million rubles, while in 1940 it was 904 million rubles. In 1956-1958 alone the government spent close to one billion rubles for rewards to rationalizers and inventors.

However, until recently serious shortcomings existed in the organization of rewards to inventors. Workers in industry have been inadequately compensated for their efforts in introducing important inventive achievements, while measures for introducing inventions and rationalizing proposals have not been included in the plans of enterprises and in fact have been considered as "accessory" and secondary. The new regulations affecting inventions and discoveries, promulgated in May 1, 1959, eliminated many of these shortcomings. The resources available for material rewards were considerably enlarged. Rewards for rationalizing proposals were increased on the average by 25%. There was a threefold increase in the premium fund for introducing into industry the ideas of inventors and rationalizers. The new regulations for inventors' premiums have considerably raised the material self-interest of workers in speeding technical progress. At the same time it is necessary to emphasize that the material rewards are only part of the problem of using the principle of material self-interest of workers in accelerating the tempo of technical improvements. It is of exceptional importance that the entire collective of an enterprise be given a material self-

interest in the creation and introduction of new technique and in the realization of the plans for development of new technique.

At the present time the main form of compensation in enterprises is to award premiums for fulfilling and exceeding the plan in terms of gross output. Experience has shown that this system does not provide the needed stimulus for the continuous rise in the technical level of production. According to this system the enterprise is interested in working out and putting into effect mainly those measures which can affect the fulfillment of the plan within a given month or quarter period. In May 1957 changes were made in the practice of premiums for the fulfillment of the production plan: bonuses were added to the basic premium depending on the specific weight of the new production included in the program of the enterprise. However, this did not solve the problem of creating an effective system of material incentives for mastering new technique. First of all, these measures applied mainly to the engineering-technical personnel and leading workers in the plant. Secondly, the scale of remuneration as it relates to the specific weight of new production, was set at very wide intervals so that the increase in the specific weight of new production about 40% in general had no effect on the amount of premium. This seriously lowered the effectiveness of this system. Thirdly, the rewards for increased output by using more advanced production methods was organically connected with the system of bonuses for fulfillment of the plan based on gross production; consequently, this system had serious defects.

In order to create more effective stimuli to technical progress it is necessary, first of all, to establish more long range standards for material rewards to workers. This is based on the consideration that in order to accomplish important structural changes in the material-technical base of the economy, it will take a number of years.

A long-range national economic plan is the foundation upon which there should be based not only the limits of growth of the volume of production and the level of labor productivity, but also the level of increase in the wage and premium fund. The leadership of an enterprise and the entire collective should be informed as to how the amount of payments will change in relation to the introduction of new technique and the growth of labor productivity. Under such conditions the collective of an enterprise would be fully interested in realizing all possibilities for raising labor productivity on the basis of advanced technique. The machine building industry is the foundation for the reequipping of our entire national economy. Therefore, special attention should be paid to the perfection of a method of material incentives for stimulating new types of production in this field.

Since 1956 the machine building industry has put into operation a Model System of regulations regarding premiums for workers for perfecting and executing new

technique. On the basis of this system the workers in this industry receive annually several hundred millions of rubles. Such a system, first of all, stimulates workers' initiative in the machine building industry in the struggle for technical progress, and increases the economic effectiveness of new machinery and equipment. However, the Model System was worked out in connection with the practical work of the Ministries. With the reorganization of the direction of industry and construction no changes were made in these regulations in the new situation. The enterprises and organizations, as before, in order to receive premiums for completion of each task, have to present to the higher organs (now the sovnarkhoz — Council of National Economy) the documents formerly handled by the Ministry. Thus, the Ryazan factory "SAM" had to present 12 documents for the receipt of premiums amounting to 50,000 rubles. The "Ryasmash" plant, in order to receive premiums of 400 rubles, presented to the sovnarkhoz 17 documents, obtaining some 20 permits. The workers at the sovnarkhoz and enterprise spent much time in filling out documents and confirming accounts as to the effectiveness of new machinery and for premium payments, which considerably prolonged the time for payment of bonuses. This gap in time between the completion of work on new technique and the time of payment of premiums seriously lowered the stimulating effect of the incentive payments.

In connection with the change in direction of industry and construction, the role of the enterprise has considerably increased. "In the new conditions," said Comrade N. S. Khrushchev at the 7th Session of the Supreme Soviet, USSR, "there is an immeasurable increase in the role of the factory, plant, mine and building project in the solution of the problems of technical progress. Actually, the enterprise is the place where the creation of new technique and the perfection of production technology is realized."

The organization of incentives in machine building for the development of new technique requires substantial changes. First of all, it is necessary to increase the authority of the administration of the enterprise on the matter of material rewards to workmen. Of interest in this connection is the experience of the Kolomensk Locomotive plant. In the motor assembly division "D-42" the workers were compensated on the basis of stages in accordance with a chart of work performed. For each level of completed work, on the direction of the plant superintendent, the workers received payment of their bonuses the following day. The engineering-technical personnel received payment upon the completion of the entire engine assembly work at a given time. The plant superintendent had the authority to withhold all or part of the premium of individual workers and engineering-technical personnel for unsatisfactory performance of the assembly work.

The procedure of organically tying in the awarding of premiums with a chart showing work fulfillment based on new technique is now in operation in a number of

enterprises and has given positive results. However, the use of this form of stimulation is often complicated by the fact that many enterprises do not have the necessary resources for paying out bonuses. This is one of the real shortcomings of the Model System as it operates in the machine building industry. The other shortcoming is that, on the one hand, the criterion for paying bonuses is the economic effect obtained by the introduction of technique, with the amount of premium being a given percentage of the obtained economic effect; on the other hand the system envisages a special fund, not directly related to the economic effectiveness of the new technique, consisting of deductions from the production costs of the articles produced by the machine building industry. As a rule, the general amount of the premium calculated on the basis of the total economic effectiveness of the measures for the development of new technique and the size of the premium fund based on deductions of 0.3% of the cost of the articles produced, do not correspond. Thus, for example, in the Leningrad sovnarkhoz in 1958 the general amount of the bonus fund calculated by the first method consisted of 60 million rubles, while by the second method it was 28.2 million rubles. Thus the sovnarkhoz had a premium fund half as large as was necessary for paying bonuses in accord with the level of the economic effectiveness of the planned measures.

This contradiction is "resolved" in practice either by the sovnarkhoz curtailing its goals for new technique for which premiums have to be paid, or by a corrective introduced into the calculations of the economic effectiveness. An investigation into these calculations covering four months of 1957 of the Moscow city sovnarkhoz for instrument-making establishments, showed that these calculations, as a rule, are corrected by action of higher organizations in the direction of lowering the premiums by 1.5-2 times. Due to the absence of any scientific method for determining the economic effectiveness of new technique, in many cases this corrective has an arbitrary character and becomes a method of mechanically limiting the amount of premium. This gives rise to a formal relation to the calculations of economic effectiveness of new technique and results in uncertainty in the enterprises as to the availability of resources to meet the established standards.

In order to eliminate this shortcoming it is necessary to solve the problem as to the sources for constituting the premium fund. In our opinion, the premium fund should be calculated on the basis of the total proceeds from the economic effectiveness which will be obtained from the planned measures for creating and introducing new technique. An important factor in organizing the bonus system should be the obligatory corrective of the final premium amount with computation of the difference between the planned and the actually obtained effectiveness. If premium payments are made only on the basis of actual effect, then, as calculations have shown, there will be no need to call upon the government for supplementary assistance.

N. Karotamm:

Electrification of Agriculture During the Seven Year Plan

In his report to the 21st Congress of the Communist Party, Soviet Union, Comrade N. S. Khrushchev stressed that "the main practical task for our country at this time is the creation of the material-technical basis for a communist society by a new mighty advance in the socialist productive forces." A more rapid tempo of electrification is one of the decisive conditions for the successful construction of communism in the USSR. Electrification plays an important role in creating the material-technical basis for a communist society and is one of the main factors making for a powerful rise in the productive forces of our country engaged in building communism.

In spite of the important advances in mechanization and electrification of agriculture, much remains to be done. The level of mechanization in many branches of agriculture is too low, especially in stock breeding. In crop cultivation many auxiliary branches are poorly mechanized (for example, cleaning and sorting seed, etc.). In order to effect a composite mechanization of all work connected with soil cultivation and stock breeding it is necessary to move much more rapidly toward electrification in agriculture.

Electrification is one of the most important conditions for the further development and growth of agriculture in the seven-year plan period. It is an important factor in raising labor productivity and in lowering production costs in many branches of agriculture.

At the present time in most farming operations, the

internal combustion engine plays the decisive role. Evidently this situation will continue for an extended period so long as no technically effective solution is found for the problem of employing electric power for the mobile farming operations. But the mechanization of stationary and auxiliary labor in farming and the composite mechanization of cattle breeding must and should be accomplished mainly with the help of electric power.

We shall cite one example of the economic effectiveness of electrification of production. According to the data of G. A. Krisk (A. N. Bakha Biochemical Institute, Academy of Sciences, USSR) an adult person can perform in 24 hours the amount of work equal to 2 kwh. of mechanical and electrical energy. If we calculate on the basis of 300 working days a year, then a grown person puts out 150 kwh. of mechanical and electrical energy which can be used in production. In other words, a mature person can perform within a year the amount of work performed by 150 kwh. of electric power. For economic calculations we can use as an index the designation "yearly electric worker," the value of which, for example, in any given country is equal to 1/150 of the amount of kwh. of electric power produced in that country.

In 1955 there were the following number of "electro-workers" in the countries listed below (according to the amount of electric energy produced):

	Per Capita of Population	The same as a % of the USSR level
USSR	5.7	100
German Democratic Republic	10.6	186
Czechoslovakia	7.6	133
Poland	4.3	75
Hungary	3.6	63
Bulgaria	1.8	31
Rumania	1.6	28
Albania	0.4	7
Yugoslavia	1.6	28
USA	25.1	440
Sweden	22.9	402
Austria	7.9	139
England	10.5	184
Federal German Republic	9.5	166
Belgium	8.4	147
France	7.6	133
Holland	5.2	91
Italy	5.2	91
Japan	4.7	82
Denmark (1954)	3.7	65

Thus, on the basis of per capita population, in 1955 there were in the USA 4.4 times more "electro-workers" than in the USSR. This is one of the main reasons for the higher

level of labor productivity in the USA as compared with the USSR, particularly in agriculture.

In 1955 in USA agriculture 20.8 billion kwh. electric

power was used, which amounts to about 44.9 kwh. per hectare of agricultural land. In USSR agriculture in 1955 there was used 3 billion kwh. of electric power, which is 2 kwh. per 1 hectare, or about 7 times less than on the farms in the United States. In 1958 no less than 6.8 billion kwh. or 13.9 kwh. of electric power per hectare of land was used in the Soviet agriculture. According to the seven-year plan the employment of electric power in agriculture should increase by about 4 times in comparison with 1958. Thus, in 1965 agriculture will use no less than 27.2 billion kwh. of electric power.

On November 1, 1955 there were 487.2 million hectares of cultivated land in the USSR. Although the structure of agricultural cultivation will no doubt change during the seven-year plan (for example in relation to the increase in the specific weight of machinery), nevertheless, the general level will remain at about the previous position. Thus, in 1965 our agriculture will need about 56 kwh. of electric power per 1 hectare of land. The rate of increased need for electric power in agriculture will thus be twice as high during the seven-year plan period as the rate of growth of electric power in our country.

According to the calculations of the Gidrosel'electro there will be a yearly need for 32 billion kwh. of electric power for the electrification of Soviet agriculture. In 1955 our agriculture received 9.5% and in 1958 21.3% of this amount of electric power. In 1955 the capacity of electrical

installations was only 3.9% of all energy used in Soviet agriculture. These facts prove that electrification of Soviet agriculture lags behind the needs of life. This lag must be eliminated as quickly as possible.

The USSR has all the possibilities to catch up with the USA in per capita electric power production; and in agriculture, in the use of electric power per unit of land. This task must be solved in a historically short period. The element of time plays an especially important role in electrification.

However, two wrong concepts hinder the utilization of these possibilities. One of these, the underestimation of the need to build thermal electric stations, was subjected to justified criticism by N. S. Khrushchev in his speech before the builders of the Volga V. I. Lenin GES in 1958.

In our opinion the other wrong concept is the notion that only large and very large electric power stations should be built.

The proponents of this concept usually rely on the relatively higher cost of 1 kwh. of electric power from the small and medium sized stations as compared to the larger power stations. However, from this fact it does not follow that it is not necessary to build small and medium power stations. The use of electric power is advisable even when the cost is relatively high. The following data supports this contention (showing that the cost of labor of 1 worker per year is about 8,400 rubles; in rubles):

Cost of 1 kwh. electric power	Expenses on 1 "electro-worker" per year	How many times the work of a person is more costly than the same amount of work done by an "electro-worker"
0.05	7.5	1120
0.1	15	560
0.2	30	280
0.3	45	187
0.4	60	140
0.5	75	112
0.6	90	93
0.7	105	80
0.8	120	70
0.9	135	62
1.0	150	56
1.1	165	51
1.2	180	47
1.3	195	43
1.4	210	40
1.5	225	37

In 1955 in the USSR there were 5,799 collective farm hydroelectric stations with average capacity of 45 kw. Under the Glavsel'electro in that year there were 317 electric power stations with an average capacity of 428 kw. These stations replaced a very considerable volume of costly and heavy manual labor.

The cost of 1 kwh. of electric power in small and medium farm electric stations is between 25 to 30 kopecks. Only in rare instances does it exceed one ruble or more. Even its use even at this cost would be cheaper than using manual labor. It follows that it is necessary to build in agriculture small and medium-sized thermal as well as hydroelectric stations. In our opinion, it is necessary to build in the villages inter-collective power stations or stations meeting the needs of only one collective or state

farm, depending on local conditions. It is necessary to use in agriculture small mobile electric stations using liquid fuel, with a capacity of 15-50 kw. or more. In the villages it is necessary to build also small thermal stations using local types of solid fuel. In the building of small and medium power stations it is necessary to make full use of the resources of water power. The cost of building such a hydroelectric station is about 7 to 8 thousand rubles, and a thermal station about 6 to 7 thousand rubles per 1 kw. of power. The building of medium and small stations is an important additional source for supplying agriculture with electric power. One should not counterpose these to the need for building large electric power stations, which are undoubtedly preferable. Nevertheless, the small and

(Continued on Page 96)

B. Svetlichny:

On the System of Training Highly Qualified Economists

The further development of residential building is one of the most important economic and political tasks of the seven-year plan. The period of 1959-1965 will largely see the realization of the objective set by the Communist Party — of ending the housing shortage in our country and of ensuring for each Soviet family a private and well-built dwelling. During the next seven years 15 million new dwellings will become available in our cities, work settlements, farms, Tractor Repair Stations and woodworking sites. This is equal to the building of 600 new cities with a population of 100,000 each. Ever greater resources are becoming available for city construction. If for the development of such branches of industry as ferrous metallurgy, mining and the light and food industries, the seven-year plan calls for an outlay of 400 billion rubles, then for the erection of dwellings, communal and cultural facilities in cities and work settlements, more than 450 billion rubles have been allocated.

Every percentage of savings in capital outlay for city construction is expressed in huge sums, running into billions of rubles. To find ways of economizing on these resources for city building is of great importance to our national economy.

The methods vary. Amongst the important means for lowering the construction costs of dwellings, cultural and service buildings could be listed: the standardization of design and the industrialization of construction; the use of effective structural materials such as large size prefabricated sections making it possible to employ basic construction processes in mounting large factory-made panels and blocks; elimination of unnecessary scaffolding; lowering the height of apartments, etc. All these measures, while not lowering the quality of the dwellings, will make it possible to reduce the cost of each square meter of living space by 10% and the cost of an apartment by 35%. Improvement in planning and organization of the construction of schools, hospitals and children's institutions, clubs, movie houses, stores, will likewise save much material and lower construction costs.

Together with these large-scale methods of conserving resources, we should also consider the rational planning and building of cities; selecting the proper location, proper choice of sites for commercial and residential buildings, economies in building thoroughfares and landscaping and in determining the maximum size of the cities.

The construction costs and the amount of current expenses from the housing fund depend to a large extent on the kind of city it will be — large or small, compact or spread out, low or high apartment buildings. The cost will also be determined by how the city area is utilized in planning railway lines and on the methods that will be used in reconstructing the city.

Considerable possibilities for effecting economies exist in this field which have as yet been little studied or utilized. The aim of this article is to deal with some of the problems of economy in city building.

The first and most important condition for effecting building economies is the proper selection of the site. The area

should be of sufficient size for accommodating dwellings and industrial structures, leaving necessary reserves for expansion. Of great importance in city planning is the need to properly anticipate growth, correct determination of the direction and extent of its industrial development and the proper proportion between the size of population and industry.

Once these important factors have been considered the development of the city proceeds in a planned and even way. Mistakes in determining the perspective for the city's growth inevitably give rise to many disproportions with harmful effects on the city organism and increase costs of its construction and operation.

Just to cite a few examples. When in 1929 in Kuznets (later Stalinsk) the building of a metallurgical combine was begun, the city planners were unable to foresee its future growth and the great attractive force this metallurgical giant would be for other industries. This led to an incorrect estimate as to the number of people that would settle in Stalinsk. At first the city was planned for 17,000, later for 80,000 and then the number was revised several times, just about keeping pace with the growth of population. The present population of Stalinsk is almost 400,000 and continues to grow.

Because of the incorrect economic planning a very restricted area was selected. The city is situated on a hill close by to the combine. After several years all possibilities for further construction in the city have been fully exhausted, making it necessary to move to the muddy area at the bottom of the hill in order to build more dwellings. This area requires special engineering preparations, the sinking of piles under the foundation of the dwellings, etc. thereby increasing the cost of every square meter of living space by 180-200 rubles. For further extension of the metallurgical combine and the building of other industries it was necessary to reclaim part of the Tom river. Expenses of such work came to 150-200 million rubles.

As the city of Stalinsk grew, other serious shortcomings of its early planners came to the fore. As a result of the construction of new blast furnaces, open hearths and coke batteries, the first workers' settlement began to complain of dust and smoke; it became necessary to eliminate the entire settlement and move its inhabitants to another area. The expansion of the plant called for extensive earth work. All this resulted in additional costs running into hundreds of millions of rubles which could have been saved by more farsighted planning and correct selection of the site for building the city and the plant.

No less informative is the history of the building of other cities in the Kuzbas — Prokopyevsk and Kiselevsk. In spite of the great promise of the vast coal deposits on which they were situated, the construction of these cities for a long time continued on the wrong path. Instead of building large residential communities outside the mining field, small settlements were established near each mine. Such settlements were erected in the Prokopyevsk-Kiselevsk region. The majority of these have had to be removed because of the opening of new coal mines. It was necessary

to resettle close to 100,000 people in hastily built dwellings at the cost of one billion rubles. In the period of 1930-1955 in Prokopyevsk and Kiselevsk alone it was necessary to tear down close to 190,000 square meters of living space (not counting schools and children's institutions), which consumed 20% of the entire housing fund assigned for new construction in this period. The cost of reconstruction, according to conservative calculations, was no less than 190-230 million rubles.

Similar examples could be cited for other coal and iron basins — Donetsk, Kargansk, Podmoskva, Chiatyrsk, Zivorozh, etc. If one were to estimate the drain of these unplanned constructions of cities in the coal and iron region on a national scale it would run into billions of rubles.

At the Tom-Usinsk coal fields, which were poorly suited for construction, the future city began to be built without any plan for using different parts of the area for various types of structures. By the time a general plan had been worked out the area was jammed with every type of building, with the result that when it came to cut through the first thoroughfare of the new city, the Mezhdyrechenka, it was necessary to pull down and move out of the way many newly built houses.

Generally in building a new city it is necessary to avoid any means the erection of temporary structures which in the future inevitably become obstacles for the planned development of the city. There is an old proverb that "There is nothing more permanent than a temporary settlement" which unfortunately holds true. Thus the need for pulling down temporary structures often results in prolonged delays in achieving a planned city. On the other hand, insofar as temporary structures sooner or later have to be pulled down, they represent an unproductive expenditure of funds.

Large material losses are also incurred in placing dwellings in unhealthy industrial zones, which makes it necessary eventually to resettle the inhabitants. In one city for example, in spite of the unhealthy effects of chemical works and a thermal electric station, more than 100,000 square meters of dwellings were erected. Upon order of the city authorities, all further building was halted and the settlers shifted. The cost of this vast error exceeded 250 million rubles.

Of considerable importance in city planning is the proper allocation of dwelling and industrial structures and in planning entire city districts. A major shortcoming in this regard is the dispersal of small dwelling settlements throughout the city. Such a scattering of dwellings necessitates long road networks, sewage and water system and other community services, and consequently increasing their cost.

Thus in Kursk, in order to build a water network through scattered settlements it became necessary to build 2 km. of additional pipe lines costing 700,000 rubles, which increased the cost of each square meter by 80 rubles. Furthermore, the dispersal of settlements makes it more difficult to apply mechanization and quick mass production methods in construction, increases the need for transport facilities and results in the dispersal of structural resources, thus prolonging the construction work. All this leads to an increase in the cost of dispersed building by 7-8% over that of large concentrated structures. Building experience in Moscow (in the Meschan region), on the right bank of Magnitogorsk and in other cities confirms these facts.

The dispersal of construction sites is one of the most prevalent shortcomings in city building. Thus, in 1957 in term dwellings occupying 141,000 square meters were built on 116 sites, in Kharkov 258 dwellings on 231 sites, etc.

The increase in costs of constructing each 100,000 square meters of living space on account of this dispersion of construction sites came close to 10 million rubles.

Experience shows the considerable possibilities of increasing the concentration of housing construction. As a result of the working out of a plan for the erection of new dwellings the number of construction sites in many cities declined by a third and fourth. Examples of the use of progressive methods in planning large housing projects and an entire complex of buildings can be had from Moscow, Leningrad, Kiev, Kharkov, Kuibyshev, Cherepovets and other cities.

Thus of great importance in carrying through new construction work in the cities, at least for the immediate period, is the conservation of the housing fund, the reduction to a minimum of reconstruction work requiring the tearing down of existing buildings and the concentration of all new building mainly in areas free of other structures. This will make it possible to eliminate the housing shortage and avoid unproductive expenses incurred in tearing down buildings.

Until recently these possibilities for economies in city building have not received the necessary attention. In general plans for the development of cities and projects for residential areas envisioned extensive reconstruction work requiring the tearing down of a large part of existing dwellings which, although obsolete, are still useful for temporary occupancy. In 1954 and 1955 alone in carrying through reconstruction in many cities some 600,000 square meters of living space in government buildings were torn down. The erection of equal new space required no less than 1 billion rubles. It should be noted that even without the above the decline in living space is very considerable: thus in 1954-1955 due to deterioration and wear nearly 3 million square meters of living space was lost.

The drain on housing resources in many cities is very high. Thus in Kharkov during the last five-year period some 45,000 square meters of living space was lost, which is equal to 10% of the space used in this period for new housing. In Kuibyshev in planning new construction the loss of old housing equalled 15% of the new construction. The drain from such losses only in the first stage of construction amounted to 12 million rubles. An exceptionally large loss was incurred in many cities in rebuilding the main streets, which often equals 20-25% of new construction. Such methods of reconstruction on a national scale will no doubt result in unproductive expenses running into billions of rubles.

Considerable experience has accumulated as to more economic arrangements for dwelling construction where entire residential areas were built on unencumbered territory. This is true of Avotovo, Okhta, the Moscow Highway in Leningrad, the North-South Region in Moscow, the Kirov Region in Kuibyshev, the right bank region in Magnitogorsk, etc.

The more effective use of city land is of considerable importance in conserving resources. Unfortunately there are many examples of city administrations, because of their shortsighted policies in using city lands, causing the government undue expenses. In Kuibyshev for many years the area alongside the main transport lines, the most promising area for future building, was used up for individual dwellings, auxiliary industrial buildings and gardens. This led to a situation where the most valuable city lands seemed to be occupied. Now that housing construction is being undertaken on a large scale the problem arises of either tearing down these structures or building on the outskirts of the city, which will increase construction costs by 6-8%.

On the city lands, in addition to dwellings, industrial

structures and transport and community services, there is usually about 25% of land that is unused. These are not only sanitation and protective zones around the industrial areas, but also ravines, river beds and other lands unsuitable for building. In city planning very often insufficient attention is given to reclaiming as much of this land as possible. Here there are large economic reserves along the highways, city transport lines, water lines and the sewage system. Analysis of a number of projects shows that it is possible to utilize 10% of this area, which would make the city more healthful and will also save considerable resources. Many planning organizations — Giprogorom, Gorstroiproektom, Lenproektom, Girkogradom and others — make exceptions as to the regulations on the closeness of building with the result that the building area spreads out to 15% above the normal size. The former Ministry for Metallurgy of the USSR confirmed plans worked out by Gipromez for the building of large housing projects in Temir-Tai where it was planned to obtain up to 25% of living space by building one-story houses requiring an additional 100 hectares of land with corresponding expenses on engineering equipment and auxiliary services. It is necessary to conduct a systematic struggle against such methods of extending the area of dwelling construction.

An important role in more rapidly providing city dwellers with housing is played by individual housing construction. However, in recent years many cities have taken a wrong approach to this type of building. The main city architects and many city administrations feared that small individual houses will "spoil the city," will prevent its development, will use up land in individual structures and divert labor to provide them with roads, water mains, and electric facilities, and prevented the allocation of lots for this purpose. In many cities as many as one, two and three thousand applications for land for individual buildings were not granted. This occurred in such cities as Tashkent, Ashkhabad, Kiev, Kharkov, Voronezh, Kuibyshev, Kaluzh and others. In refusing to allot this land the city authorities lost no less than 25 to 30 thousand square meters of potential living space which could have been erected without any substantial cost to the government.

Considerable possibilities for lowering construction costs are connected with the correct distribution of industries on city land. This has a large bearing on the cost of the road network, city transport and other services. Therefore, the distance between city buildings and industries should not exceed the limits required by sanitation, fire protection and other needs. The unreasonable extension of these limits, in addition to the inconvenience to those working in these industries, results in additional expenses in materials, rails, pipe lines, cables, cement, etc. These factors are often ignored by city health authorities who insist on unnecessary requirements for extending the distance between the industrial and residential areas.

The cities pay heavily for the tendency of some administrations and chief architects to turn over to industrial establishments much more land than they actually require. Thus for one chemical combine an area of 100 hectares was allotted. Many of these areas are in large part transformed into waste land which artificially expands the boundaries of the city and increases the cost of all communication. This also applies to the planning of shops in industrial regions in cities. The irrational building of industrial establishments not only leads to needless capital outlays, but also increases for an entire period the expenses of maintaining communication and other city services.

The savings in resources connected with the correct planning of industrial construction in cities are quite

considerable. As one example we can cite the plans for constructing a factory at Krasnoyarsk. An examination of this project showed the possibilities of cutting down the area by one third without jeopardizing the sanitary and fire protective considerations and increasing the compactness of construction in the factory area by 30-38%. As a result of this investigation in terms of possible economies in land area it was possible to reduce the building area by nearly 11% and its cubic capacity by 10%.

Investigation of other projects showed the possibility of reducing the space between buildings by about 30%, which substantially shortened all communication lines and reduced construction costs by 2-3%. In light of the vast industrial construction now in progress, the proper planning of industrial projects can be counted in savings running into many millions of rubles.

Very often the development of city industrial regions proceeds without any planning by simply mechanically adding one new building after another without any outlook as to further development and the economic relation between the enterprises. As a result there is frequent duplication of roads, electric lines, water and sewage facilities in the auxiliary shops and industries. Often no provisions are made for inter-connecting adjacent industrial buildings. This greatly increases the cost of construction of city and industrial communications.

In order to eliminate these shortcomings it is necessary to work out unified projects in industrial regions which provide for a composite solution of the city planning problems which would comprise a general communication system for the group of industries. This would go a long way toward regularizing city planning, reduce its territory and lower costs of building and operation of industry.

Further contributing to the reduction of construction costs would be planning on a regional scale which would include proper location of industry, electric stations, the residential area, the system of water mains and canalization, as well as the building of a unified and more economic network of railroads and highways.

With modern planning of regional construction projects there will be established in each region a unified plan which would fully eliminate nonproductive expenditures of enterprises which duplicate engineering work and networks. According to the regional plan for the Pavlodarski industrial complex, it was possible to plan for several industrial groups and city services a unified construction base with a general system of engineering communication and transport network. Considerable economies were also effected in working out plans for the region of Krasnoyarsk GES, Krivorozh iron ore basin and other areas.

Contrariwise, failure to work out modern regional planning projects leads to many unwarranted expenditures. Thus a number of industries in Angarsk were located on a low level which resulted in insurmountable obstacles in perfecting a more economical system for utilizing the hydroelectric power of the Angara. In order to avoid flooding these industries, it was found necessary to build two smaller electric power stations in place of a large one, which entailed additional expenditures of materials and resources. It was necessary to build a new railway line and bridge across the Angara to avoid flooding, which involved an outlay of 400 million rubles. And all as a result of the absence of regional planning.

Because of the lateness in planning in the oil producing regions of the Bashkir ASSR there developed a situation in the city of Salavat where plans were made not for 150,000-180,000 people required for the development of that region but for only 25,000 inhabitants, with one-story houses and

narrow streets. The decision to reconstruct the city will now require considerable expenditures for rebuilding of streets, installations and the network of water lines, sewage, etc.

Ever increasing importance is being attached to the question of correct planning of residential regions. The erection of small dwellings in these areas inevitably leads to the building of a dense network of streets, occupying at times 30 and more percent of the area. As a rule, these streets have no value for transportation. But their building and maintenance entails considerable expense. Estimates show that the building of each kilometer of street with a 25-meter width costs about 1 million rubles. Thus the erection of a network of small dwellings often no larger than 1-2 hectares requires the construction of tens of kilometers of needless streets with vast expenditures of money.

It is necessary to use the progressive method of building larger blocks of houses, so-called micro-regions, extending over 20-30 hectares. This will reduce the street area from 30% to 12-15% of the general living space of the region and improve the general living conditions of the inhabitants, since it is possible to erect in these micro-regions all necessary servicing and cultural facilities, parks and playgrounds. City transport is designed so that it passes through the main streets at the boundaries of the micro-regions. It is also possible to reduce the length and width of the inner quarters passages. As a result the cost of each square meter of living space is reduced by 15-20 rubles. With the general introduction of such progressive methods of city planning and in light of the vast scale of housing construction now under way, it means a saving of hundreds of millions of rubles and large quantities of building materials. In Magnitogorsk the cost of building only two streets — Lomonosov and Kalinin — came to 1-1/2 million rubles. This could have been avoided if large housing blocks had been built. Similar examples can be given from the experience of other cities.

In view of the high cost of asphalt surfacing, efforts should be made — in city planning — to sharply differentiate as to the different kinds of streets. A number of large thoroughfares are needed to interconnect different parts of the city. The width of these thoroughfares should be sufficient to accommodate the estimated volume of traffic. According to the Institute "Dormostproekt" of the Mosgorisolkom, the expenses of building one running meter of street with a 40-meter width and with a 9-meter width of the passages, costs 1,400 rubles, a width of 18 meters costs 960 rubles and 24 meters 2,392 rubles. This means that the unnecessary widening of the street from, say, 18 to 24 meters increases the cost of each kilometer of street by 30,000 rubles.

Needless expenses are incurred in the building of wide asphalt inter-block passages with two-sided sidewalks of a width of 6-9 meters, when in most instances passages of 5 meters are fully adequate. Extending the width of the passages from 3.5 to 5.5 meters increases the cost of 1 km. of passage by about 70,000 rubles. For inter-block passages it is necessary to use a lightened type of surfacing, corresponding to the weight of light machines. This can give up to 40% in savings as compared to asphalt-concrete surfacing with gravel base, which is used for the main transport thoroughfares.

The practice of building closed blocks of strict geometric shape under difficult topographic conditions calls for additional earthwork, basements and ground floors, which could have been avoided if the building terrain had been chosen with greater care and if the nature of the topography had been taken into account in determining the type of buildings

to be erected.

Experience with building several blocks of houses in Saravov showed that increased cost of dwelling construction due to improper choice of terrain reached 50-60 rubles for each square meter of living space.

The use of geometric methods for building without taking into account the local topography makes it necessary to carry out considerable work for the vertical planning of the construction as a result of which the top soil is often ruined, making it more difficult to complete the landscaping work. Expenses for replacing the top soil often amounts to half of all the landscaping costs. It is necessary to use flexible methods of planning and erecting building quarters with the aim of suiting the type of building to the conditions of the natural terrain, which considerably reduces building costs and at the same time makes it possible to use various types of picturesque methods in building the streets and building blocks. In several foreign countries such construction methods have been widely used.

An important factor in lowering building costs is the establishment of the most economical height of the structures. In accordance with the decisions of the Central Committee of the Communist Party, Soviet Union and the Council of Ministers of the USSR, it is necessary to build in the cities mainly houses of 3 to 5 stories as being the most economical and in the smaller cities and settlements, 2-3-story houses. However, there is a definite tendency in many cities to build 3- and 4-story houses. This is often influenced by the fact that five-story houses without elevators are not as convenient. But there is overlooked the fact that in the new type projects the height of dwellings has been reduced from 2.8 to 2.5 meters. This means that a new five-story house is only about 1 meter higher than the former four-story apartment due to the shorter and therefore "easier" stairways. It should be kept in mind that the cost of a four-story house is by 2-5 to 3% higher than a five-story apartment. This higher cost is to be explained by the fact that with the same expenditure for the foundation, roof and walls, the living space in the four-story house is 20% less than in the five-story dwelling. The cost of each square meter of space is increased by 30-40 rubles. With a construction volume of 100,000 square meters the increase amounts to 3-4 million rubles and on a national scale the increase will run into hundreds of millions of rubles. Lowering the number of floors from 4-5 to 2-3 results in other expenses since with fewer stories a larger area is required for the same number of apartments, which also increases the cost of public services.

It follows that in medium and large cities 80-85% of all living space should be used for building 4-5-story apartments, preferably five stories. It is understood that these recommendations are not applicable to seismic regions.

Sometimes buildings are put up in 2-3 sections, which creates many topographic and other complications. Lessening the length of buildings — for example, from 4 to 2 sections — increases the cost of each square meter of living space by about 2% or 20-25 rubles. Therefore, in medium and large cities with favorable topography close to half of all houses should be built in four sections, with the 3-4 section houses making up about three-fourths of the building structure.

A lowering of the cost of housing construction can be effected by building large, centralized regional boilers in place of multiple, small boilers for individual dwellings. This will give about a 12-ruble economy for each square meter of living space, not counting the substantial lowering of operating costs.

Considerable economies can be effected also in

landscaping. There is a widespread practice of building public squares by planting trees, erecting heavy and expensive entrances, fences, granite platforms and stages, expensive fountains, lanterns, etc. It would seem more expedient to build lawns, living fences and growing bushes, planting groups of trees, building of sand and gravel paths in place of asphalt with granite sidings, getting away from expensive entrances, etc. This is not only incomparably cheaper but also more attractive. Calculations made by the Academy of Construction and Architecture of the USSR showed that the introduction of such progressive methods of landscaping will reduce costs on this work by no less than 10%.

An important problem requiring special investigation is that of the maximum size of the city. It is known that the bigger the city the greater the requirements for organizing transport, building bridges, overbridges, digging complex and costly water pipelines, canalization, etc. With increase

in the city's size the problem of feeding the population, particularly supplying fresh vegetables, becomes more complex. In large cities it becomes necessary to build subways, and although this is an attractive form of transport, it should not be forgotten that each kilometer of tunnel costs about a hundred million rubles. Many of these problems are very easily solved in small and medium sized cities. On the other hand, in very small cities it is costlier to build and operate public services. The scientific determination of the optimum size of the city would make possible large economies in their operation and administration. This is one of the most important problems of economic science.

The potential sources of economies in city building are inexhaustible. The fuller utilization of these sources — this is the task of economists, architects and builders.

*N. Buzulukov and S. Kamenitser:**

On the System of Training Highly Qualified Economists**

At the present stage of our country's development the role of economic study has grown as never before and in the future it will continually increase. This is determined by the great increase in the scale of production, by fundamental changes in its structure, by the expansion and greater complexity of economic ties between regions of the country and within individual regions, between branches of production, and so forth. Working out national economic plans, particularly perspective plans, determining the most effective means of developing production, selecting the best rational directions for the introduction of new technique and the rational directions of capital investments, preventing possible disproportions in the national economy, correctly utilizing such economic levers as prices, profits, premiums, wages — this is a far from complete list of the problems posed to economists.

Not one of these questions can be decided without a profound study of the operation of objective economic laws, a good knowledge of production, its technique and technology, and a mastery of statistical methods and economic analysis. The economist must meet all these requirements. He must approach the solution of each question by considering the interests of the national economy as a whole, he must be able to look ahead toward the development of science and technique, to decide all questions not only from the point of view of the present situation but also in perspective, helping in this way to raise the economy to a new level. These requirements must be met by economists regardless of where they are working: in a shop, economic council or a central planning organ. Everywhere the economist must observe the interests of the whole national economy, he must be a champion of the economic policy of the party and government.

Despite the growing importance of economic work, it is obviously underestimated in several spheres of economic construction. As a matter of fact, the fact that tremendous reserves for accelerating the development of production have been and are being poorly utilized in some branches of the national economy, that specialization of enterprises is being carried out slowly, that there are serious defects in the organization of labor and wages, and that losses of valuable raw and other materials are tolerated, is determined to a considerable extent by the low level of economic work. Planning and economic organs do not always notice in time the qualitative changes occurring in the technique and organization of production and therefore cannot come to proper conclusions.

The main reasons for the lag in economic work are the weak economic training of many leaders of economic organizations and enterprises, of engineering-technical personnel, as well as the shortage of qualified cadres of economists and their weak tie with production. Thus, according

to data of the CSA USSR, there are 32.2 thousand economists working in the apparatus of the union and republic ministries and departments, of whom 10.2 thousand have a higher education, which means that 68% of the economists do not have special higher educational training. In the apparatus of city and regional planning organs, out of 10.5 thousand economists only 1.5 thousand have special higher education. Planning organs of oblasts, territories, and autonomous republics are similarly supplied with economists. In oblast and regional planning commissions of the RSFSR 75% of the personnel holding the job title of economists do not have the corresponding special training. Because of the lack of necessary knowledge many of them are unable to correctly plan the means of further developing the economy of the oblast or region.

Matters are still worse at industrial enterprises. In the overwhelming majority of cases the workers of planning, financial and other economic departments at enterprises and in a number of lower planning organs do not have special education and the necessary theoretical knowledge to approach questions of developing the national economy in an all-sided state manner. One can name many enterprises in each of which there are hundreds of engineers with diplomas working but there is not one qualified economist. For example, at the Kirov Tractor Plant in Chelyabinsk more than 90% of the engineers have a higher education while only 3-5% of the economists have a higher education.

According to data of the CSA USSR there are about 200 thousand enterprises in state industry. According to the same data on July 1, 1955 there were 113.8 thousand economists, statisticians and commodities experts with higher education working in the national economy of the USSR. Of these, about one half were employed at industrial enterprises. Therefore, there was one qualified economist for an average of three enterprises, and if we exclude small enterprises we get one economist with a higher education for an average of two large enterprises. Agricultural enterprises are not at all provided with cadres of economists. Even in large collective farms there are no economists; there are only accountants, and even these as a rule do not have the corresponding special training. In the meanwhile, collective farms must themselves prepare plans for the development of their economic activities, including perspective plans, must determine the structure of production, work out crop rotation, decide questions of the choice of crops and the rational utilization of technique. It is here in particular that an economic evaluation of different variants of the plan must be undertaken. In actual practice there is no one to do this. It is with great difficulty that a task like determining production costs of agricultural output and labor productivity in agriculture is solved.

A great deal of work has been done in our country to train economists with a higher education. Thus, according to data of the CSA, between 1928 and 1957 higher educational institutions graduated 200 thousand specialists in the fields of economics and law. Nonetheless, as may be seen from the facts cited above, the supply of cadres of economists is completely inadequate for the national economy.

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** Designed to pose the question.

In the prewar period there were several large educational institutions in Moscow training economists of higher qualifications, including educational institutions with an extensive curriculum. Among these were the Moscow Planning Institute of Gosplan USSR, the All-Union Planning Academy of Gosplan USSR, the G. V. Plekhanov Institute of National Economy in Moscow. In addition, a number of faculties and institutes trained engineers-economists. However, the All-Union Planning Academy was liquidated subsequently and the G. V. Plekhanov Institute of National Economy in Moscow was transformed into a narrow-branch higher educational institution training cadres for trade organizations. The Leningrad Planning Institute was merged with a financial-economic institute and this was accompanied by a decline in the student contingent. The number of students in several other economic higher educational institutions was also reduced. As a result of this the share of economists among specialists with a higher education declined from 6.2% in 1940 to 5.2% in 1957.

Despite the great need for cadres of economists and the need to expand their training, there is a strange theory of the "overproduction" of economists in circulation among some leading personnel. In connection with the current fundamental reorganization of the work of higher educational institutions, their curricula are being revised and the student body is being determined anew. Under these conditions it would appear necessary to thoroughly investigate questions of the character of the training of economists, the determination of the student bodies of the corresponding higher educational institutions, and to deeply think through the whole system of training economists. However, this has not yet been done. The admission of students into economic higher educational institutions and into economic faculties of universities has been sharply cut in recent years. In our view, the Ministry of Higher Education of the USSR has taken a number of unjustified measures in this field. Thus, in the 1955-1956 school year a considerable number of economists in the economics of industry were reclassified as specialists in labor economics, while a group of students from the Institute of Oriental Studies were transferred to the Moscow State Economic Institute for the purpose of reclassifying them as economists in the economics of industry. At the same time, many future engineer-economists in mechanized computing were hastily shifted to the specialty of economists in accounting, and the faculties of mechanized computing remaining in a number of higher educational institutions were curtailed, although even then a great need for economists in this specialty was felt in the national economy.

Evidently, the need to decisively change the system of planning the training and distribution of young economists has become urgent. In our opinion it is feasible to plan the distribution of young cadres not according to the application of ministries, economic councils and other organizations as is done now, but on the basis of scientifically elaborated norms. The fact of the matter is that many organizations frequently present applications which do not correspond to the real requirements of production. Sometimes this is explained by a reluctance to replace already working personnel who lack special education with specialists who have a higher education, and in other cases by a poor estimate of the requirements for cadres of economists for enterprises under construction, as well as an underestimation of the importance of economic work at existing enterprises. If the Gosplan of the USSR and the Ministry of Higher Education of the USSR would really study this question deeper and would work out a perspective plan for training and distributing young specialists-economists, the

situation would be radically changed.

Industrial personnel are justifiably posing the question of the need for a legal affirmation of a regulation on economists and propose that in this regulation, as provided in regulations concerning a number of other specialties, it should be stated that the position of economist can be held only by an individual who has received a special economic education. Insofar as the many economists-practical workers are concerned, they must be helped to obtain a corresponding theoretical training in the next few years. For this purpose it is necessary to expand the network of correspondence and evening schools as well as to create special departments in large economic higher educational institutions for increasing the qualifications of economists.

The economic training of engineers in higher educational institutions is in need of improvement. They must study economic questions not only in special courses, but also in technological and other engineering courses. A great deal of work carried on to raise the level of economic knowledge of engineers working at enterprises and institutions does not always ensure their proper economic training.

One of the reasons for the weak level of economic work also stems from the fact that there has not yet been a complete solution to the question of the knowledge required of specialists trained in the field of the economics of branches of the national economy. It is expected that economists will know how to generalize mass phenomena, reach correct scientific conclusions from them and formulate rational proposals. In this connection it is necessary to train economists with an extensive background, that is, specialists with a good knowledge of economics as a whole and therefore with a profound mastery of the methods of economic work in their concrete specialty. These cadres are needed at all links — from the enterprise shop to the economic council, department, and higher planning organ. The specialization of such economists can be according to branches of the national economy (industry, agriculture, trade, transport, and so forth) and according to major national economic problems (planning of the national economy, price formation, labor economics, and others).

With the present structure of the organs of management in industry and construction, and in the light of the important tasks presented to the planning organs of union republics, oblasts, cities and regions, the importance of training cadres of economists with an extensive background has particularly increased. Therefore, one is surprised at the statement of O. Kozlov and V. Girovsky* that economists with an extensive background were needed only during the early years of socialist construction while the need for their training has now passed. Comrades Kozlov and Girovsky contrast an economist with an extensive background with the engineer-economist having a branch background, and declare that the former is no longer needed and must be replaced by the latter. They accept as correct the position of the Ministry of Higher Education of the USSR on reducing the student body of higher educational institutions training economists with an extensive background. In the opinion of O. Kozlov and V. Girovsky the specialists trained for economic work in economic councils, ministries, planning and Soviet organs, enterprises, construction sites and transportation, must be only engineers-economists. They believe that this applies equally to economists working in scientific-research, planning-technological and planning institutes. If one is to agree with this and to follow this line a great deal of injury can be caused to the development of the national economy. For it is in the current conditions of

* See "Problems of Economics," 1958, No. 12, p. 49.

considerably greater complexity of inter-branch and inter-regional ties, of developed combination and cooperation of production, when a profound analysis of the economic indices and structure of production is necessary, that economists possessing an extensive background in the field of economics are particularly needed. Many workers in economic councils understand this well. The Moscow oblast economic council alone requested 356 such economists this year. Such inquiries are also received from other economic councils. And how about organs of the planning system? Can they really conduct planning work successfully without economists of this type? Of course not. In creating, at the initiative of Gosplan USSR, the Moscow State Economic Institute (MGEI) for training economists with an extensive background, a resolution adopted in 1945 emphasized that the MGEI must prepare "specialists for work in the system of Gosplan USSR, in the gosplans of union republics and people's commissariats, as well as scientific workers in the field of economic science." This directive has not lost its significance for the present day.

Branch differentiation in the training of cadres of economists is often defended on the grounds of the peculiarities of the technique, technology and economics of the different branches of the national economy. But the number of branches of industry and agriculture in our country is very large, and the training of economists, let us say, for the food, machine building or other branches of industry does not yet solve the problem of their branch specialization because each of these branches in its turn consists of a considerable number of smaller branches with great difference in technique and economics. Besides, an economist working in any link of the national economy must now deal with various branches of the economy. In the meanwhile, a narrow-branch training of specialists will not provide them with the possibility of gaining a thorough understanding of a number of complex questions of the development of one or another branch. We may cite the example of the chemical industry. An economist working in this branch must know to perfection not only the economics and technology of his branch, but also the economics of the national economy as a whole and particularly those branches which consume the output of the chemical industry, as well as the economics of machine building which supplies equipment for chemical production, and so forth. Analogous requirements must be met by economists working in machine building and in any other branch of production.

Under present conditions economists must work in the most diverse links of the management of socialist production, beginning with Gosplan SSSR and ending with the enterprise. The knowledge and specialization required of economists in these links differs fundamentally. Therefore, it follows that the training of economists should be differentiated depending on the future place of work (Gosplan, economic council, enterprise, shop). In this connection it is necessary first of all to provide for the training of economists with an extensive background for the apparatus of general state planning organs (central and local), the apparatus of republic ministries, economic councils and their managements, for the Central Statistical Administration and its republican and oblast departments, as well as for the Ministry of Finance, banks and local financial organs. In the process of training and in the first years of work these specialists must study deeply the production and peculiarities of development of one or another branch so that, on this basis, they will be able to analyze the economic processes in the country as a whole and to reach the necessary conclusions.

In our opinion economists for these organs should be

trained by the State Institute of the National Economy (with a five-year period of study) which should be created on the basis of the currently existing Moscow State Economic Institute with an expansion in the group of specialists trained here. In this kind of higher educational institution cadres must be trained in an extensive background and an adequately intensive specialization. In the first two and a half years of instruction all students would study political economy, philosophy, history of the CPSU, statistics, law, accounting, finance, economic geography, history of the national economy, technology and some general educational subjects. In the third year specialization would be undertaken in the following directions: national economic planning, price formation, labor economics, finance, the economics of industry, construction, agriculture, transport, trade, material-technical supply. In addition, a great need has arisen to train economists in the planning of the national economy who know how to use electronic computing machinery. The Moscow State Economic Institute has begun to train such cadres.

It should be emphasized that the study of specialized subjects in all courses must be conducted from a national economic point of view. In every course the student must study the economics of all the principal branches of the national economy, and his work presented for a diploma, completing the five-year period of study, must be on a many-faceted theme closely connected with the needs of production.

Together with training economists in an extensive background it is necessary to train economists for enterprises in industry, construction, agriculture, transportation, trade. Such a task, in conformity with the individual branches of production included in the category of the major branches of the national economy, can be performed by economic higher educational institutions in the course of a four-year period of training. These are higher educational institutions offering a narrower type of economic training. Here, the economics and finances of one of the major branches of the national economy must be studied intensively. Such higher educational institutions must graduate specialists who are able to plan intra- and inter-branch cooperation, specialization and combination of enterprises, who can elaborate proposals for raising the effectiveness of capital investments and profitability in the given branch, for improving the utilization of production funds.

To lead production at large enterprises (work in dispatching organs, planning-production organs at enterprises and in shops) there is a need for cadres with a good engineering education who are being trained by engineering-economic higher educational institutions and in special departments of technical higher educational institutions. The training acquired by these cadres has fully justified itself, such specialists have an independent sphere of application, and they should not be contrasted with either economists with an extensive background or with economists who are branch specialists. All three of these specialties of economists are necessary for the socialist national economy. In addition, teachers of political economy trained in economic departments of universities are needed for technicums and other educational institutions. There is also a need for cadres of economists of intermediate grade for small industrial enterprises, large shops, small collective and state farms, savings banks. These cadres can be trained by economic and financial technicums. Such a system of training economists will make it possible to supply our economic and planning organizations with qualified cadres.

An important problem in improving the training of

economists is that of the correct selection of pupils from among whom the student body of economic higher educational institutions is chosen. In order to creatively grasp the whole system of sciences taught in economic institutes, the student must know production, must creatively use the knowledge he obtains in the higher educational institution, and not simply memorize the material presented in lessons. Therefore, in the training of qualified economists it is important, to a greater degree than in the training of other specialists, that the future student have some vital experience, that he know production, and having entered the institute that he have the possibility of applying his knowledge to practical activity in the course of his training. Therefore, it is expedient to select students for economic higher educational institutions from among individuals who have an adequate period of practical work and some vital experience. The further increase in the vital experience of the future specialist during the years of his training in the higher educational institution must be attained by strengthening the bonds between the higher school and production, by an organic combination of the educational process with productive labor. It is highly desirable that student-economists spend a prolonged period of time in production, working there at first as ordinary workers, dispatchers in a shop, and then (in senior courses) as economists.

The economist must profoundly master Marxist-Leninist theory. Therefore, in the first three years of study in the economic higher educational institution a great deal of attention should be paid to the study of political economy, philosophy, history of the party.

An important role in the system of training the economist is also played by the mastery of technology and an intensive study of statistics and accounting. The qualified economist must master statistical and mathematical methods of analysis to perfection, must know how to read economic tables, to see behind the figures those processes which are occurring in the national economy. He must investigate thoroughly the economic content of the enterprise accounts, must know how to independently organize a simple, operational, exact and economical system of accounting at the plant, in the state farm, collective farm and in transportation.

Unfortunately, in the teaching of statistics principal attention is frequently paid to the examination of statistical indices without a profound disclosure of their essence, and in the accounting course problems of the correspondence of accounts dominate, rather than problems of the economic analysis of reports and the organization of accounting.

Quite frequently, instead of a thorough study of the methods of economic analysis of the development of production and the influences that improve the operations of the enterprise, the teacher acquaints students with instructions on the method of filling in planning and reporting tables, requisitions for various documents, and so forth. It is not accidental, therefore, that in their practical work young economists in planning organs do not pay sufficient attention to the all-round planning of the economic activity under their jurisdiction, and are of not much help to personnel in production in revealing and utilizing reserves for the improvement of the enterprise's work.

The technological training of the economist, as we know, has the object of helping the student to understand the essence of the processes operating in industry, agriculture, in transportation and in other branches of the national economy. It must provide him with the possibility of gaining an understanding of the perspectives and principal tendencies of technical progress. However, such training of students is not always conducted in a well thought-out manner and does not always yield the desired results.

The structure of the curriculum in many economic and engineering-economic higher educational institutions is also in need of improvement. Such important divisions of economic science as the balance of the national economy, price formation, the distribution of productive forces, and others have unfortunately been dropped from the curricula of many economic higher educational institutions. The reorganization of curricula must lead to a decline in the number of hours of compulsory studies in the higher educational institution and to an increase in the time spent on the independent work of the students. Students must have the possibility of spending more time in the study of Marxist-Leninist classics reading current literature, being at enterprises and planning organs more frequently with the object, in particular, of analyzing reporting and planning documents. In this connection it is necessary to strengthen the personal contact between teachers and students in the form of individual and group consultations, the role of which must increase considerably.

In the training of economists with various backgrounds, special economic training plays a large role along with general methodological and technical disciplines. But there are also serious deficiencies here. One cannot imagine, for example, an economist of any background who, in addition to knowing the economics of his branch of the national economy and questions of planning and accounting, would not have mastered the methods of economic analysis of all sides of the production-economic activity of the enterprise. However, in many higher educational institutions sufficient attention is not paid to these questions. The study of the economics of branches, the planning of the national economy, the economics and organization of enterprises in industry, agriculture, transportation and trade, equip future economists with a good knowledge of the regularities of development of individual branches of the economy, the ability to work out measures designed to accelerate the development of the national economy, to improve the utilization of productive resources, to economically justify the effectiveness of capital investments and expenditures connected with the introduction of new technique. These disciplines equip students with the knowledge necessary for a rational organization of production.

The final stage in the training of economists is also in need of improvement. In technical and many other educational institutions instruction in the higher educational institution is completed with the preparation of a special project presented for the diploma. This form of work permits the future specialist to display most fully his aptitude knowledge, his ability to think and create. Many diploma projects yield quite a bit of benefit to the national economy with interesting and necessary problems being worked out in them. In most economic higher educational institutions the system of giving state examinations has been retained until now. However, experience has shown that the preparation of written diploma projects has also justified itself in economic higher educational institutions. It provides the student with the possibility of working on concrete economic material, creatively applying his theoretical knowledge and introducing interesting proposals concerned with the work of an enterprise, branch, or the development of the economy of an economic administrative region.

Our country needs highly qualified cadres of scientific economists for the system of branch and national economic institutes and higher educational institutions. During the last few years higher educational institutions have trained quite a few scientific workers. However, the number of qualified scientific workers in the country is still inadequate. For example, this is indicated by the following

figures: among the total number of scientific workers in economics, 2.1% are Doctors of Science and 39% are Candidates of Science. Consequently, 59% of all scientific workers in economics do not have an academic degree.

The training of scientific workers must begin with early school days. A constant and active student connection with production and a strengthening of their independent work will increase the activity of scientific circles and will make it more possible to reveal among their participants the most capable students. It is necessary to a greater degree to bring students closer to the work of the faculty: to give students assignments in the collection of materials, in the elaboration of individual themes, to invite them to meetings of the faculty where interesting reports are discussed, etc. Insofar as the most capable students are concerned, the faculty must continue to observe them after they have completed the higher educational institution, to write to them regularly, give them assignments, recommend themes for their independent work, training them for further scientific work. In addition, it is also necessary to keep an eye on practical workers with whom the faculties of higher educational institutions and scientific-research institutes come in contact. The most capable of the practical workers must also be drawn into scientific-research work. In this connection it may be noted that there are never any shortages of applicants for those departments which engage in these measures.

Improving the quality of the training of economists is connected with a further strengthening of the material base of economic and engineering-economic higher educational institutions. Unfortunately, the Ministry of Higher Education of the USSR is still only slightly concerned with these questions, at times underestimating the importance of laboratory equipment of economic higher educational institutions.

The level of training of economists depends a great deal on the character and level of scientific research and published economic literature. Many faculties of economic higher educational institutions still conduct scientific-

research work poorly and have weak ties with production. Branch publishing houses release few books on economic questions (and very slowly at that), including monographs and studies on questions which concern economists, engineers, leaders of shops, industrial and agricultural enterprises. The publication of economic periodicals is also lagging seriously. In order to issue scientific studies and literature on teaching methods economic higher educational institutions need adequate printing and publishing facilities, without which it is impossible to expand and raise the level of research in economics conducted by teachers of higher educational institutions.

Raising the level of economic education requires the establishment of close and systematic ties of economic higher educational institutions and technicums with institutions and enterprises, setting aside a number of enterprises at which the proposals worked out by scientific workers of higher educational institutions and technicums could be provisionally verified. The nature of projects presented for a diploma must also be substantially changed; their themes must be important problems of enterprises or economic regions capable of being handled by students. It is necessary that Gosplan SSSR, gosplans of the union republics and the economic councils pay more attention to economic institutes, that the forces available in higher educational institutions be drawn into the working out of major national economic problems. Also, practical workers in planning organs should be drawn more boldly into teaching work. Up to now the bonds between planning organs and economic higher educational institutions have been inadequate, and this has harmed higher educational institutions as well as planning organs. In the future economic higher educational institutions must achieve a strengthening of creative ties with production, with Gosplan USSR, with gosplans of the union republics and with the economic councils; such ties are an important condition for raising the quality of scientific and educational work in higher educational institutions, as well as one of the factors in improving economic work in the national economy of the USSR.

V. Zhamin:

On the Transition to Socialism by Economically Underdeveloped Countries

The question of the possibility of a direct transition to socialism by economically backward countries who are at a pre-capitalist stage in development was first posed by Marx and Engels at the beginning of the 60's in their works on colonial problems, as well as in other studies. The brilliant ideas of Marx and Engels on the possibilities of the transition to socialism by backward countries, passing over the capitalist stage of development, were buried in oblivion by the opportunists of the Second International.

V. I. Lenin defended the great ideas of the founders of scientific communism on the possibilities of a non-capitalist path of development to socialism for economically backward countries and worked out a theory of building socialism in colonial and semi-colonial countries freed from imperialist oppression.

Lenin posed this question: can we recognize as correct the position that the capitalist stage of development of the national economy is inevitable for those backward people who free themselves from imperialist bondage? We have, said Lenin in 1920, answered this question in the negative: "It is incorrect to assume that the capitalist stage of development is inevitable for backward peoples." (1) The Leninist theory, developed by Communist and workers' parties, was brilliantly confirmed by the practice of socialist construction in the Soviet Union, the Chinese People's Republic, the Mongolian People's Republic, the Korean People's Democratic Republic, the Democratic Republic of Vietnam, and the Albanian People's Republic.

The experience of the national liberation revolutionary movement of oppressed peoples, particularly after the second world war, has shown that the presence of the corresponding economic and political prerequisites is of the greatest importance for the development of economically underdeveloped countries on the path to socialism.

First of all, it is necessary that the bourgeois-democratic, anti-imperialist, anti-feudal revolution in the underdeveloped, economically backward countries during the period of the general crisis of capitalism, under appropriate conditions and first of all under the leadership of the Communist Party — the party of the working class — acquire the character of a people's democratic revolution. The experience of the Chinese, Vietnamese and other revolutions carried out under the leadership of the working class testifies that the people's democratic revolution is the most important political prerequisite for the development of a backward country along the road to socialism.

As we know, in China the people's democratic stage of the revolution covered a prolonged period — three decades (from 1919 to 1949), and with the creation of the Chinese People's Republic the socialist stage of the revolution began. In the Mongolian People's Republic the period 1921-1940 was characterized by a transformation of a general democratic nature designed to liquidate feudalism and create the conditions for a non-capitalist development of the economy. In the Korean People's Democratic Republic the

tasks of the general democratic revolution were basically solved in the period between August 1945 and 1950 but as a result of the aggression of American imperialism the peaceful development of this country was interrupted. Only after the signing of the armistice in 1953 were the conditions created in the KPDR which made it possible to undertake the building of socialism on a wide front. The long war of the Vietnamese people for freedom was concluded with the triumph of the anti-colonial August Revolution in 1945 and the creation of the Democratic Republic of Vietnam. In 1958, after the carrying out of the land reform and the restoration of the national economy, the country entered a new stage in economic construction, the stage of all-round planned development of the economy and culture of the country, the building of the foundation of socialism. In the course of the national liberation struggle in Albania the Italian and German occupiers were expelled in 1944. From 1944 to 1947 a democratic transformation was carried out in this country which created the conditions for fulfilling the tasks of the new stage, the stage of socialist transformation.

Thus, practice has confirmed the Marxist-Leninist position that only through certain stages of the revolutionary transformation of a semi-feudal, semi-colonial and colonial social-economic structure is a direct transition to the construction of socialism possible. The establishment and strengthening of a revolutionary-democratic dictatorship of the proletariat and peasantry in the course of the people's democratic revolution ensures its most rapid development into a socialist revolution and the consolidation of the dictatorship of the proletariat.

Secondly, a most important prerequisite for the transition to socialism by economically underdeveloped countries is, as V. I. Lenin pointed out, the assistance given by the proletariat which has taken power into its hands in the advanced countries. In 1920 V. I. Lenin said: "If the revolutionary victorious proletariat will conduct systematic propaganda among them (the people of the backward countries — V. Zh.), and the Soviet government will grant them aid with all the resources at its disposal, then it is incorrect to assume that the capitalist stage of development is inevitable for backward peoples... With the help of the proletariat of the leading countries the backward countries can go over to the Soviet system and through definite stages of development to communism, passing over the capitalist stage of development." (2)

In our country the previously backward peoples of outlying regions (the regions of the North, Central Asia) received brotherly assistance from the more developed socialist nations, in particular from the Russian socialist nation, which made it possible for them to go over to socialism, passing over the capitalist stages of development.

V. I. Lenin provided an all-round foundation for the question of creating a unified anti-imperialist front in the

other countries and colonies, as well as in the dependent countries. After the victory of the socialist revolution the united front of struggle of the working class of the mother countries and the national liberation movement in the colonies, under appropriate conditions, can grow into a union of the victorious working class of the mother countries and the toiling masses, primarily the peasantry, of the colonial and dependent countries. Thus, for example, the national liberation movement of the Mongolian people became directly linked to the socialist revolution in Russia after 1917. The geographical proximity of Mongolia to the Soviet Union made it easier for the Soviet people to grant assistance to the Mongolian people rising in the struggle against imperialism, for national freedom. This was also helped by the historically conditioned economic, political and cultural ties between Russia and Mongolia, close ties between the toiling masses of these countries.

In the present situation, assistance to economically backward countries taking the path of socialism is conducted within the framework of the socialist world economic system. The close collaboration between the countries of the socialist camp promotes a rapid raising of the economically underdeveloped countries to the level of the advanced ones and this affects the successful construction of socialism and communism in these countries. In a speech in the People's Republic of Albania on May 28, 1959 Comrade N. S. Khrushchev stated: "You are meeting the first stages of socialist construction more rapidly because you can draw on the necessary experience of others, there are others from whom you can receive aid and support, while we did not have this. Making use of this experience and brotherly support of socialist countries you are accelerating the development of your economy and culture."

With the Soviet Union entering the period of the developing construction of communism and with the successful socialist construction in the people's democracies the possibilities for strengthening economic ties between countries of the world socialist system are growing constantly greater. In Comrade N. S. Khrushchev's report to the 21st Congress of the CPSU the basis is laid for the theoretical conclusion that socialist countries, by successfully utilizing the possibilities inherent in the socialist system, will more or less simultaneously make the transition to the higher phase of the communist society. While under capitalism, particularly in the epoch of imperialism, the law of uneven economic and political development of different countries operates, and a struggle for the repartition of the world which enslaves economically backward countries is taking place, in the socialist system of world economy other laws operate. Previously economically backward countries, depending on the experience of other socialist countries, on collaboration and brotherly mutual aid, on the advantages of the socialist economy, are raising the level of their economy and culture. From this arises the possibility of a gradual levelling in the economic and cultural development of socialist countries.

The ideas of Marxism-Leninism on the non-capitalist path of development for underdeveloped countries, on the assistance of the advanced socialist countries to the people who have freed themselves from imperialist and feudal oppression, are a powerful attractive force for all peoples of Asia and Africa. The successes of the toilers of the national republics of our country, the Chinese People's Republic, the Mongolian People's Republic, the Korean People's Democratic Republic, the Democratic Republic of Vietnam, and the People's Republic of Albania exercise a great revolutionary influence on the whole course of the national liberation struggle of the people of Asian and African countries.

The experience of the development of socialist states shows to the people of other countries the kinds of successes that can be attained if at the head of the liberation movement stands the working class, interested in the most consistent solution of the tasks of the bourgeois-democratic revolution and its growth into a socialist revolution. Rallying around itself the peasantry, the small urban bourgeoisie and progressive elements of the national bourgeoisie, the working class ensures the development of the country along the socialist path, a steady growth of the productive forces in the interests of the whole people.

In examining questions of socialist construction in countries that were backward in the recent past, it is necessary to take note of several factors which exercise a decisive influence on the forms, methods and rates of carrying out socialist transformations in individual states.

One of these factors is the original level of economic development of the given country or large-scale national region. In a resolution at the 10th Congress of the Party, "On the Next Tasks of the Party on the National Question," the necessity of taking account of a variety of circumstances prevailing in the Soviet Union at the time was pointed out. "If, from the 65 million non-Great Russian population, we exclude the Ukraine, Byelorussia, part of Azerbaidzhan and Armenia, all of whom have gone through the period of industrial capitalism in one degree or another, this leaves about 25 millions of primarily Turkish population (Turkestan, a large part of Azerbaidzhan, Dagestan, Caucasians, Tatars, Bashkirs, Kirgiz peoples and others) who have not gone through capitalist development, who do not have or almost do not have their own industrial proletariat, who have retained in most cases a cattle raising economy and a patriarchal way of life (Kirgizia, Bashkiria, Northern Caucasus) or those who have not yet gone fully beyond a semi-patriarchal, semi-feudal way of life (Azerbaidzhan, Crimea and elsewhere) but have already become drawn into the general flow of Soviet development." (3) These diverse states of economic and cultural development of the different peoples of our country were taken into account in the process of carrying out the socialist transformation in individual republics and regions.

Because of the semi-colonial, semi-feudal character of its development, at the time of its formation the Chinese People's Republic also had a low level of development of productive forces. A deformed, colonial development of industry and the remnants of feudalism in agriculture were characteristic of the Korean People's Democratic Republic until the recent past. Before the creation of the Mongolian People's Republic a feudal structure existed in the country and the influence of foreign capital was considerable. Industry was almost absent and feudal relations in agriculture survived in pre-revolutionary Albania and Vietnam. All of this requires particular forms of building socialism in these countries.

Class contradictions and the relationship of class forces within the given country have the closest connection with the level of development and the character of the economy. In certain countries taking the path of building socialism the relative weights of various economic structures differ and therefore the relationships between the size of the working class, peasantry, and so forth, differ.

The special conditions of the transition to socialism are also determined by the character of the economic dependence of the particular country on foreign capital before the revolution and its influence on the country's economy (the magnitude of capital imports in various forms, the number of foreign industrial, transportation and other enterprises, the

degree of development of comprador bureaucratic capital and so forth). Of basic importance are the degree of development of commodity-money and barter relations in the countryside, the relationships between the classes of landlords, kulaks, middle peasants and poor peasants. The level of literacy and culture of the broad masses of people also has a considerable effect on the forms and rates of socialist transformation.

One of the particular features of the development of backward peoples along the path to socialism is the liquidation of the remnants of feudalism and other pre-capitalist forms of economy. The elimination of pre-capitalist forms of economy requires the elaboration of methods which take into account the degree of class consciousness of the broad masses of the peasantry and of concrete economic conditions. Therefore, in some cases, even in the stage of the socialist revolution, at the same time that socialist transformations are being carried out a considerable role is played by measures designed to complete the tasks of the bourgeois-democratic revolution and above all to carry out land reforms helping to liquidate the remnants of feudalism in the sphere of agrarian relations.

The land reforms carried out in the central Asian republics of our country are of great interest. In the previously backward outlying regions of the USSR these reforms were carried out in several stages. While in the central regions of Soviet Russia the transition to the new form of land utilization on nationalized land was for all intents and purposes completed in 1918-1919, in these regions the nationalization of land and the transition to the new form of land utilization and the liquidation of feudal remnants were completed only in 1925-1928.

In 1921-1924 in the course of the Mongolian revolution important reforms designed to liquidate feudal relations were carried out in the country: serfdom, feudal duties and mutual responsibilities were abolished, debts of herdsmen to foreign usurers were annulled, economic and legal privileges of feudal owners were liquidated. The ownership of land and pastures by the nobility was abolished and the land was transferred to general public property and taxes were levied on feudal and monastic enterprises. The constitution adopted in November 1924 in a legal manner consolidated the nationalization of land. However, it was still necessary to conduct a great deal of work in liquidating the economic basis of the feudal lords. According to data of the 1928 census, the middle ranks of herdsmen and the rural poor constituted 83% of the total population of the republic. They constituted 95% of all economic units but they owned only 45% of the livestock. Secular and ecclesiastical feudal lords as well as the rising capitalist and kulak elements who constituted altogether 17% of the population and 5% of the economic units owned 55% of the livestock. The 7th Congress of the Mongolian People's Revolutionary Party (1928) adopted a decision to take the offensive against the economic positions of feudalism. As a result, in 1929 the property and livestock of 670 large feudal economic units (out of 729 units registered in that year) were confiscated. Property confiscated from secular and church feudal lords and valued at 4.5 million tugriks became available to the state and to working herdsmen. The feudal lords resisted the confiscation, tried to break up their enterprises and sold their livestock. In 1930-1931, in answer to this resistance the property and livestock of 800 enterprises were confiscated and measures were taken to undermine the economic positions of ecclesiastical feudal lords by transferring livestock belonging to monasteries to middle peasants and the rural poor (they were given about 2 million head of livestock, that

is almost 65% of the monastery livestock).

Thus, the experience of the USSR and the Mongolian People's Republic showed that under certain conditions the liquidation of the remnants of feudalism in backward regions and countries can be carried out on the basis of land nationalization.

But the liquidation of such remnants can also be carried out on the basis of dividing up landlords' land and transferring to peasant property. The rich experience of the Chinese People's Republic, the Korean People's Democratic Republic, the Democratic Republic of Vietnam and the People's Republic of Albania testifies to this.

V. I. Lenin showed that the problem of the nationalization of land, the most important means of production, must be solved depending upon the concrete agrarian relations within the particular country, the degree of readiness of the peasantry for land nationalization. The requirement of land nationalization, as Lenin pointed out, "is by no means everywhere and always revolutionary." (4)

In 1906 V. I. Lenin in his work on "The Revision of the Agrarian Program of the Workers' Party," wrote: "...The positions of social democrats on the agrarian question in these days when it is a matter of completing the democratic revolution can only be the following: against landlord property, for peasant property, given the existence generally of private property in land. Against private property in land for nationalization of land, under certain political conditions." (5)

Lenin's ideas on the possibility of utilizing the subdivision of land as a revolutionary measure to liquidate the remnants of feudalism in the sphere of agrarian relations were creatively applied in the people's democracies. There, land was part of trade turnover, it could be freely bought and sold not only by landlords but also by peasants. Allotment landowning was absent. Therefore, in the people's democracies of Europe as well as Asia the method of liquidating the remnants of feudal landownership which as the most understandable and closest to the peasants was the division of the land.

Insofar as the scale of the transformations carried out in the people's democracies in the sphere of agrarian relations is concerned, the Chinese People's Republic occupies first place. Revolutionary agrarian transformations began to be carried out here in the old liberated regions long before the creation of the people's republic. In the old liberated regions they were carried out (prior to October 1, 1949) on a territory encompassing a rural population of 120 million persons. After the creation of the CPR the agrarian reform was carried out on the basis of the law of June 28, 1950 on the remainder of the territory of the liberated part of the country.

Simultaneously with the division of landlords' land and its transfer to the private property of peasants, nationalization of large masses of virgin and fallow land, large strips of land in suburbs, large-scale irrigation structures and water sources was carried out in China, which carried favorable conditions for building state farms, irrigation canals, etc. As a result of carrying out the reform 300 million Chinese peasants received 46.6 million hectares of land. In 1954 the reform was carried out in one of the large national regions of the CPR, in Sintsian.

Characteristic of the people's democracies of Asia was a reduction in rent and loan rates as a preliminary measure preceding the division of landlords' land, as well as a careful determination of the class character of particular economic units. The existence of many transitional forms of economy (from feudal and semi-feudal to capitalist) and the great diversity of relationships connected with this required

careful determination of the class position of every economic unit.

A general regularity of all countries' transition to socialism is the creation and continuous strengthening of the state sector of the economy. This regularity also operates fully in the development of economically backward countries along the road to socialism.

With the establishment of Soviet power in our country, including in the national republics and oblasts, the nationalization of large-scale industry was carried out after appropriate preparation. In Turkestan the nationalization of industry began in March 1918 and enterprises of heavy industry were the first to be nationalized: oil, coal and others. Almost at the same time all enterprises of the cotton industry and of creamery and soap production and quilted material factories were nationalized. In August 1918 the Council of People's Commissars of Turkestan undertook the nationalization of the leather industry, and in 1919 several enterprises of the light and food industries were nationalized.

In carrying out the nationalization of banks, industry and transport the working people of the Soviet national republics made use of the rich experience of the socialization of the means of production in the RSFSR. The government and the Communist Party of Soviet Russia granted all-round support and material assistance to its fraternal republics in the creation of a socialist economy.

The development of the people's democracies confirmed the objective necessity of socializing large-scale means of production by means of nationalizing them. It should be noted that this process took place at rapid rates in the stage of the people's democratic revolution. Not only under the dictatorship of the proletariat but also under conditions of the revolutionary democratic dictatorship of the proletariat and peasantry, the state sector of the economy is the economic foundation of the people's power. The rise and development of the state sector in the period when general democratic tasks rise to the forefront signifies the growth of the democratic stage into the socialist stage of the revolution.

In underdeveloped countries a regularity of the people's democratic revolution is the carrying out of socialist nationalization of property belonging to foreign and comprador-bureaucratic capital. In China even before the creation of the people's republic, in the old liberated regions confiscated enterprises became national property and on this basis the state socialist sector was created. Thus, in the north-eastern part of the country back in 1946 at a meeting of representatives of provinces of North-Eastern China it was decided to transfer to the people's power, as general public property, the industrial, transport, financial and trade enterprises of the Japanese, of the government of Manchoukuo and of other traitors to the Chinese people. In the same year railroads, electric power stations, communal enterprises and so forth were transferred to the provincial authorities of Northern Manchuria. By the end of 1949 6/7 of all industrial enterprises were already nationalized, that is, essentially all of the heavy industry of the region. It should be noted that in this region (the North-Eastern) more than one-half of the productive capacity of the country's heavy industry was concentrated at the time. In the future as new regions of the country were liberated the number of nationalized enterprises grew, as a result of which by 1950 the most important branches of heavy industry in China came into the hands of the people's democratic state.

In the Korean People's Democratic Republic the socialist state sector already occupied a large relative share in the stage of the people's democratic revolution. Here, a considerable part of the industrial enterprises belonging to the

Japanese imperialists were nationalized. In 1946 the state sector of industry in the KPDR accounted for 72.4% of gross production and in 1949 the figure was 85.5%.

In the Mongolian People's Republic the basis for creating a state sector was the nationalization of the small number of existing industrial enterprises — the "Mongolor" joint stock company in the gold industry, and small-scale handicraft enterprises also belonging to foreign capital. For the MPR it was characteristic that already in the general democratic stage the state sector developed chiefly through the industrial construction of new enterprises beginning in 1925, while large-scale modern enterprises began to be built in 1934. The output of state industry increased by more than six times between 1934 and 1938.

In the Democratic Republic of Vietnam there were not many large-scale industrial enterprises. In 1956 the gross production of industry constituted one-sixth of the total gross production of industry and agriculture. In recent years the output of industry and handicraft production have been growing rapidly.

In the socialist stage of the revolution, with the unfolding of socialist industrialization the state sector of the national economy grows particularly rapidly and becomes strengthened. Its expansion occurs chiefly through the construction of new, as well as the reconstruction of old enterprises. In the process of industrialization the structure of industrial production changes fundamentally. Branches of heavy industry develop most, taking into account the international division of labor within the framework of the world socialist system. The expansion and strengthening of the state sector signifies a strengthening of the position of the socialist structure not only in the sphere of production but also in the sphere of circulation — in banking and in trade.

The development of the national economy of previously economically backward countries with the assistance of leading socialist countries leads to an economic levelling of peoples on the basis of a rational social division of labor and the liquidation of the national isolation of individual states. A regularity of the construction of socialism in economically backward countries is the creation of a material-production base for the new society by means of socialist industrialization.

The industrialization of previously economically backward national republics and oblasts of the USSR was conducted in accord with Leninist principles of the location of production. On this basis there were created large centers of socialist industry in previously backward regions which in Tsarist days were agrarian-raw material appendages to the older industrial regions.

Under conditions of the unfolding construction of communism Leninist national policy finds a new clear expression. The control figures of the development of the national economy of the USSR for 1959-1965 provide for more rapid rates of growth of productive forces in the eastern regions than in the Soviet Union as a whole. More than 40% of the total volume of capital investment is being directed to these regions. Major qualitative changes in industrial production are contemplated. In Kazakhstan, in addition to the production of non-ferrous and rare metals, the production of pig iron is being organized for the first time; steel production will increase here by 15 times and the production of artificial fiber by 10 times. Uzbekistan will occupy one of the leading places in the Soviet Union in the development of the gas industry. The powerful growth of the economies of the eastern national republics of our country reflects the unified process of natural transition from socialism to communism of all the peoples of the Soviet Union on

the basis of their friendship and fraternal mutual assistance.

With the creation of a socialist system of world economy the expansion of the economies of recently backward countries is being realized in accord with an international division of labor within the framework of the world system of socialism. Those branches of industry and agriculture which can yield the maximum economic effect based on a rational utilization of natural wealth, labor resources and other factors are being developed most.

In such a great country as China the whole complex of industrial branches is being developed. In the Chinese People's Republic during the years of the first five-year plan a great deal of attention was paid to capital construction, and above all in industry. In this period the construction and reconstruction of 825 large-scale industrial enterprises was begun, and these were the basis of the socialist industrialization of people's China. A sharp expansion of the national economy of the republic was achieved at the beginning of the second five-year plan. In 1958 the smelting of steel doubled as compared to 1937 and reached 11 million tons while the production of coal was 270 million tons. In 1958 alone 50 thousand machine tools of various types were produced, which was almost double the total number of machine tools produced in 1957.

In the Korean People's Democratic Republic a reorganization of industry was carried out with the aim of liquidating its colonial, distorted character. On the basis of a high level of the power industry there is a development of the mining, electrical machinery and chemical branches of industry as well as of light industry. In the Mongolian People's Republic and in the Democratic Republic of Vietnam light industry has been most developed. However, even in these countries some branches of heavy industry are beginning to play a constantly increasing role.

A fundamental characteristic of recently economically backward countries is a more extensive use, at first, of the private capitalist sector in industry and trade for expanding productive forces than prevailed in the more developed countries. These countries were characterized by the utilization of a number of specific methods of the socialist transformation of the private capitalist enterprises of the national bourgeoisie, with the utilization of various forms of state capitalism being of decisive importance.

V. I. Lenin, working out theoretical questions of the construction of socialism, paid a great deal of attention to the problem of state capitalism in the transition period from capitalism to socialism. He particularly emphasized the role of state capitalism under conditions of petty commodity production, in an economy demolished by civil war and intervention. Lenin pointed to the progressive significance of large-scale capitalist enterprises in comparison with the spontaneously developing millions of units of small-scale commodity producers.

The Communist Party of China, creatively developing Leninist ideas on the role of state capitalism in the transition period, corroborated the position on the possibility of utilizing state capitalism for transforming the private capitalist form of property into the socialist form. As a result of the fact that the urban small bourgeoisie as well as the national bourgeoisie along with the peasantry were allies of the working class in China in the struggle against foreign imperialists, in solving the main contradiction of the transition period — the contradiction between the working class and the bourgeoisie — the method of peaceful transformation was used and is being used here not only in regard to peasant and handicraft economic units but also in regard to capitalist industry and trade.

State capitalism in China represents capitalist enterprises

controlled and regulated by the people's democratic state. As a transition takes place from lower forms of state capitalism (state supply of raw materials, purchases of output and so forth) to higher forms (mixed state-capitalist enterprises) there is an increase in the degree of influence of the state over capitalist economic units, the spontaneous, anarchic character of development inherent in capitalism is overcome more and more, the degree of exploitation of workers is limited, the planned regulation of production on the part of the state is strengthened. The share of the private capitalist sector in gross industrial production in the CPR was 63.3% in 1949, 39% in 1952, 16.2% in 1955 (6), and in 1956 after the reorganization of industrial branches all private capitalist enterprises were transformed into mixed state-private enterprises.

In the Democratic Republic of Vietnam the state-capitalist sector is not yet sufficiently developed. Collaboration between the state and private capital is carried out by means of the state placing orders with private entrepreneurs for the processing and manufacturing of goods, supplying raw materials, purchasing finished output, using private entrepreneurs as agents in selling state commodities, creating mixed state-private trading agencies and associations. Therefore, the policy of the party and government in regard to the national bourgeoisie is to involve it in building the groundwork of socialism by means of state capitalism.

In the Korean People's Democratic Republic forms of private economic and state capitalism were also utilized, particularly in the democratic stage of the revolution. Under current conditions private economic and state capitalism occupies an insignificantly small place. The comparatively small relative weight of the private capitalist sector in the national economy of the KPDR is explained by the fact that in the period of the colonial development of the economy the position of capital was insignificant. Before the war private firms produced principally silk and cotton cloth, as well as textile equipment, small pumps, steam boilers. In addition, during the war years the majority of capitalist enterprises were destroyed.

The countries taking the path of socialist construction are confronted with complex tasks in the matter of reorganizing agriculture. The transformation of agriculture in all countries building socialism is also being carried out on the basis of general regularities: the Leninist cooperative plan lies at the basis of the socialist reorganization of agriculture.

Cooperative organization of the peasantry in agrarian backward countries is one of the main problems of the non-capitalist, that is, socialist path of developing agriculture. In this connection the process of cooperation in individual countries and regions has its own particular characteristics. Thus in the Soviet republics of Central Asia and the Transcaucasus, in accord with local economic requirements, diverse forms of cooperatives were created — meliorative, cotton growing, silk raising and wine-making cooperatives.

Despite the great work done by the Soviet state in eastern regions, remnants of the patriarchal structure continued to exist for a long time. This factor determined the peculiarities of the collectivization of agriculture in these regions. These consisted in the fact that collectivization was conducted here in a struggle not only against capitalist remnants but also with remnants of pre-capitalist production relations. In the decisions of the November (1929) Plenum of the CC of the party it was pointed out that in the national regions "the development of collectivization and the building of state farms are bound up with the liquidation of remnants of the feudal structure, that furious resistance cannot help

but be stirred up by kulak and semi-feudal elements who have retained considerable influence in the countryside in some cases and are conducting a persistent struggle against socialist construction under the guise of defending 'national interests,' etc." (7)

As one of the characteristics of collectivization in the outlying regions of the Soviet Union we must note the slow transition of peasant households, which were primarily of a natural character, to a collectivized economy. For example, among the small nationalities of the North collectivization was completed only on the eve of the Great Patriotic War. To a certain extent this was also typical of regions of China which were primarily cattle raising regions populated by national minorities; the rates at which cooperatives were formed here were somewhat slower than in other regions of the country.

It should be pointed out that in the previously economically underdeveloped regions of the USSR and in the people's democracies of Asia the simplest forms of peasant cooperation became widespread and existed for a long time. The higher forms of production cooperation were chiefly characteristic of regions in which production was highly marketable, particularly where technical crops were produced. Thus, in Uzbekistan where the bulk of the peasantry were engaged in cotton growing — the branch of agriculture with greatest marketability — the share of agricultural artels in 1932 was 98.1%, while the share of tozy was only 1.7%. In the Turkmen SSR the share of tozy was 59.8%, in the Tadzhik SSR it was 47.1%, in the Kirgiz SSR 26%, and in the Kara-Kalpak ASSR 33.2% of all collectivized units. (8)

One of the remnants of old, feudal relations in the Mongolian People's Republic is the natural and semi-natural character of the livestock economy. With the establishment of people's power in Mongolia, as in other people's democracies, there occurred a levelling out of the countryside, which testifies to an increase in the material level of life of herdsmen toilers. At the same time the existence of private economic units hinders the further development of cattle raising. There is a shortage of working personnel and great difficulties arise in procuring fodder. In 1957 and particularly in 1958 in the MPR a mass movement for cooperation among herdsmen developed. Agricultural societies in 1957 included 35% of all herdsmen economic units and now they include more than 96%.

One of the obstacles to the cooperative form of organization and to the further expansion of productive forces in the MPR is the nomadic way of life of the herdsmen. A great deal of work is now being done to shift herdsmen to a settled way of life.

In the Chinese People's Republic, the Korean People's Democratic Republic and the Democratic Republic of Vietnam the lowest, simplest form of production unification of peasants was the labor mutual aid groups. They do not introduce basic changes into the principles of the small-scale peasant economy since they are created on the basis of private ownership of the means of production. At the same time these groups play an important role in overcoming difficulties connected with a shortage of draft power and agricultural implements, promoting an increase in the productivity of agricultural labor, educating wide masses of peasants in the spirit of collectivization and thereby creating the prerequisites for organizing agricultural production cooperatives which generally arise on the basis of developing permanent mutual aid groups.

The experience of the Chinese People's Republic, the Democratic Republic of Vietnam and the Korean People's Democratic Republic also convincingly demonstrates the need for extensively utilizing transitional forms of economy in the form of primary (or lower) type of production cooperative in the process of the socialist reorganization of agriculture. Such cooperatives combine land (as before, this remains private property but is paid in as a share) and means of production (structures, implements of labor, cattle and so forth). The distribution of incomes is based not only on labor but also partly on the shares contributed to the cooperative. Such forms of cooperation promoted the gradual transition of the peasantry to higher forms of production cooperatives of the agricultural artel type, and in China to the people's communes.

The experience of the development of the socialist revolution in previously backward countries convincingly demonstrates that the triumph of socialist production relations even before the creation of a comparatively high level of development of productive forces is a regularity of the development of these countries. But for the triumph of the socialist method of production in previously economically underdeveloped countries the affirmation of socialist production relations is not enough; it is also necessary that a certain level of development of productive forces be attained. The level of development of productive forces is characterized by the quality and quantity of technique used in production and by the production experience of the people, the degree of concentration of production, as well as the branch and territorial social division of labor, that is, the degree of development of the social character of production which in the final account is reflected in the mass of the principal products created after taking into account the size of the country's population and the peculiarities of the national structure of social consumption.

Socialist production relations exercise a great revolutionary influence on the productive forces, accelerating their development. The rapid growth of the productive forces of economically backward countries is being promoted by the considerable assistance being given by developed socialist countries. All of this creates the conditions for the complete triumph of the socialist method of production in underdeveloped countries in the shortest historical period.

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A. Kozlov:

State Property Belonging to the Whole People and its Reformist and Revisionist Critics

The cornerstone of anti-Marxist theoretical conceptions of socialism and the basis of all the slanderous attacks on the social-economic structure of the USSR and other socialist countries are the distorted "theories" of socialist property. At the same time, it is in answering the question of what the economic basis of a socialist society should be, that the ideological and political bankruptcy of all types of reformist and revisionist theoreticians, the crisis of right opportunist ideology, is most fully and clearly revealed.

The greater the successes attained by the people of socialist countries in developing their economies and culture, in raising their standard of living and improving socialist democracy, and the more obvious becomes the indisputable fact that at the basis of these achievements are the new socialist relations between people conditioned primarily by the existence of state property in the means of production belonging to the whole people, the more stubborn and refined are the attempts of the servants of imperialism among the right socialists and renegades from communism to conceal this fact and to convince the working people that in order to achieve socialism, not only is the socialization of the means of production "unnecessary" but it is also "counter to the evidence."

In defending their fantasies the ideologists of reformism and revisionism hold that the establishment of state property in the means of production belonging to the whole people inevitably leads to an all-powerful state, totalitarianism, the liquidation of democratic freedoms and institutions. The argument of the defenders of "free democracy" consists, on the one hand, of artificially dividing and contrasting two indissolubly linked concepts — social control of production and distribution, and the social ownership of the means of production — and, on the other hand, of also artificially combining what cannot be combined — the dictatorship of the bourgeoisie and the dictatorship of the proletariat, to which they slanderously ascribe a "totalitarian" and "exploitative" character.

Current right socialist leaders and publicists openly defend state-monopoly capitalism and reject the socialist socialization of the means of production as an "outdated measure." The development of bourgeois democracy, the strengthening of the "equalizing role" of the state, the growth of the trade union movement, the transfer of "actual economic control" from the hands of capitalist owners to the hands of "managers" who are presumably guided not by the profit motive but by public interests — these are the "natural tendencies" in the development of capitalism at the present stage in which the preachers of the "new theory of socialism" place their hopes. In these changing circumstances the need for fundamental economic transformations presumably disappears. Reformist theoreticians unceasingly reiterate that at the present level of development

of society economic factors have generally moved into the background and the dominant role is being played by political and moral factors. A prominent ideologist of British laborism, R. Crossland, in his book "The Future of Socialism" attempts to demonstrate that the character of property in the means of production no longer exercises a determining influence on the social structure (1), and his colleague, J. Strachey, has devoted many pages in his book "Contemporary Capitalism" to defending the view that "the interaction between the economic base and the political superstructure is, above all, reciprocal and weaker than Marxists admit." (2) Although Strachey declares in passing that "the clear and definite idea of the concept of socialism presumes the replacement of private property in the means of production by social property," (3) for him and his accomplices this question is not of fundamental importance. Social property for the Labor Party theoreticians is not the path to socialism and is not a necessary prerequisite for achieving it but some kind of formal symbol, a probable result of the "evolution of capitalism," something that will be attained in the indeterminate future and by indeterminate means. The purely verbal "recognition" of the necessity for a socialist socialization of the means of production is needed by Strachey only in order not to break too obviously with old socialist traditions and under the guise of such a "smoke screen" to conceal the fundamental difference between socialism and capitalism.

However, more and more often even these types of reservations are disappearing in the right wing socialist literature and in the programmatic materials of social-democratic parties. This is clearly expressed in the actual abandonment by right wing socialists of their conceptions of nationalization. A few years ago the leader of the British Labor Party, H. Gaitskell, began a campaign to revise the attitude of the Labor Party to nationalization, particularly in his brochures "Socialism and Nationalization" and "Recent Developments in British Socialist Thinking." (4) Gaitskell holds that the form of property in the means of production is not of essential importance in the transition to socialism. Everything, it appears, depends on carrying out "democratic control" through the trade unions, the redistribution of incomes through taxation and the acquisition by the state of shares in capitalist enterprises. These are the "theoretical investigations" lying at the basis of the new programmatic documents of the Labor Party, the brochures "Industry and Society" and "A Plan for Progress," which contain no socialist demands at all and which are wholly directed to the strengthening of British state monopoly capitalism.

The same tendencies are also clearly seen in other right wing socialist parties. The draft program of the Social Democratic Party of Western Germany states that "the general socialization of the means of production is not a desirable system for the economy today." (5) A socialized economy is viewed as a "compulsory economy" while the

Note: The citations from US and British publications have been retranslated from the Russian.

deal is proclaimed as "a free mixed economy" in which capitalist property and the rule of monopolies are retained. Insofar as social property in the means of production is concerned, for the authors of the program this "is not a dogma but a question of expediency and need." In the draft program of the Socialist Party of Austria the socialization of the means of production is viewed as a particular and especially practical problem. These formulations offer sufficient testimony on how far their authors are from genuine socialism.

However, capitalist reality by no means adapts itself to still-born reformist schemes. The development of productive forces on the basis of modern technique is reflected in the further concentration of production and a deepening of the division of social labor. As a result, the social character of the process of production appears still more clearly. The maturing scientific-technical revolution also breaking through in capitalist countries (the progress of automation, achievements in atomic physics, etc.) is leading to a still greater strengthening of this natural tendency. Now, as never before, it is clear that the productive forces growing within the framework of capitalism are limited and distorted by this framework, that only a planned organization of the whole economy in the interests of the whole society will make it possible to do away with the sharpening contradictions of capitalism, to use the great potential of the already available production apparatus in developed capitalist countries and to ensure a rapid growth of all branches of the national economy. In other words, the need for a comprehensive socialization of the means of production is becoming all the more urgent and sharp.

That which reformists who have completely broken with Marxism proclaim openly is also repeated in a more or less veiled form by current revisionists. In words they are not against social property in the means of production. But as soon as one becomes more acquainted with their views one discovers the theoretical kinship of these views with the principal dogmas of the right-wing socialists.

First, in complete unanimity with right-wing socialists the current revisionists see in the strengthening of state monopoly capitalism a growth of "socialist factors" and a constantly growing "restriction of the role of private capital." In the program of the Union of Yugoslav Communists the section "On State Capitalism" states: "The growing strength of state capitalist tendencies in the capitalist world is the clearest proof that mankind is irrepressibly and by the most diverse paths deeply moving into the era of socialism, into an era when socialism is increasingly becoming the content of the everyday practice of all mankind." This, indeed, is "the clearest proof" of the right opportunist, reformist character of revisionist "conceptions."

Secondly, the capitulation of current revisionists to reformism is expressed in their view that the highest form of socialist socialization of the means of production is not property belonging to the whole people but group, collective property, in their rejection of the Marxist idea of a unified national economy and the special role of the socialist state as the force directing and coordinating the development of the economy. This matter must be examined in greater detail.

What do revisionists understand by social property in the means of production? Formally, they recognize that the means of production must belong to all society, but this recognition is accompanied by such reservations that actually it is negated. In reality, viewing state socialist property as "indirectly social" and proposing the idea of

"directly social property," the revisionist theoreticians hold that the latter is realized in the form of the collective property of workers of individual enterprises in the output produced and in their collective control of the means of production attached to the enterprise, as well as in the form of control over the activity of the enterprise by local organs of self-government. In this way, for example, E. Kardelj depicts "a consistent form of social property, that is, property under the direct democratic management of an association of producers." (6) In the textbook "Principles of Political Economy" issued in Yugoslavia this same idea is carried to its logical conclusion. The author of the textbook, L. Markovich, in the chapter on "Socialist Commodity Production" writes that the socialist enterprises must have "their economic individuality. As producers, they must have 'their own power' in deciding questions of the production expenditures of their labor and means of production, 'power' in taking decisions on the production of definite use values... They must have their own individual interests here which do not coincide fully with social interests and establish mutual relationships only by means of exchange in the market..."

Thus, the complete detachment of enterprises is viewed as "the higher form of socialist socialization of the means of production"! It is true that Markovich attempts to disguise the anti-Marxist essence of his reasoning by citing the idea that in addition to carrying out "production ties" between enterprises through the market they must also be united by means of "social ties" carried out through the plan. But here he holds that it is the market "which appears actively as the factor correcting the plan and the consciousness of people."

It is not difficult to understand that we have here a renovated variant of traditional anarcho-sindicalist views which have nothing in common with Marxism-Leninism. Group property, of course, may have a socialist character but, as V. I. Lenin pointed out and as the historical experience of socialist countries has entirely confirmed, only with the existence of the dictatorship of the proletariat and the leading role of property belonging to the whole people can enterprises based on group property be really socialist enterprises.

Right opportunist ideologists and current revisionists conceive the essence of the category of the social interest metaphysically: as the simple arithmetic sum of individual and collective interests. From this follows the frequently reiterated revisionist conclusion: it is necessary to give scope to the "free" (read — spontaneous) realization of individual and collective interests, and as a result of this presumably the social interest will triumph as the natural resulting movement of diverse interests. Any intervention by the socialist state in this process is viewed as an attempt to "push society on the path to stagnation and deformity." (7)

But arithmetic is of no use in this matter. A dialectical approach is necessary here. Just as society is not the simple sum of its members, so the general public interest is not the arithmetic sum of individual interests. The fact that under socialism the interests of society and of the individual personality basically and largely coincide does not remove the problem of contradictions between them. These contradictions cannot be resolved by means of the automatic self-regulation of individual interests. A planned and purposeful combination of individual and social interests is needed. In other words, a social mechanism is needed which makes it possible to secure the general public interest and the active and widespread participation of the working people in the management of social life.

Current revisionists declare that such a social mechanism

is self-government on the basis of group property. In this system producers "are directly joined" to the means of production while property belonging to the whole people presumably signifies "the alienation of the means of production from the direct producers." L. Markovich writes in his textbook: "Beginning in 1950 in Yugoslavia for the first time in history (since primitive society) there is the realization of a direct union between living labor and its natural instruments — the means of production. Living labor acquires power over the means of production. A period of self-government by producers sets in." Thus, primitive communal society is proposed practically as the ideal for a socialist society.

If this kind of direct union between producers and the means of production is undertaken it would be still "better" to give each member of society his own means of production, that is to return to individual private property.

It is curious that this absurd conclusion has already been reached. True, the honor of this discovery belongs not to the current revisionists but to the bourgeois American economists L. Kelso and M. Adler. In their book "The Capitalist Manifesto" they maintain that all the contradictions of capitalism arise not from the rule of private capitalist property in the means of production but because this has been monopolized by a narrow group of individuals, as a result of which wide masses of the population are deprived of the possibility of owning the means of production. Kelso and Adler propose that the "capitalist revolution" be completed: that private property be diffused in such a manner that each member of society becomes a capitalist. This would presumably be "a direct union between producers and the means of production." (8) As we see, this solution is even more "cardinal" than that which the revisionists propose, while their points of departure are the same: anarchic vain attempts to "free" the individual from society, to liquidate all centralism in the management of social affairs.

The problem of socialism is not at all a matter of "arming" each member of society and each unit of society (for example, the collective body of the enterprise) and making them capable, on their own responsibility and risk, of "asserting" their rights in the face of the presumably inevitable encroachment of central social organs. The genuinely socialist character of combining social and individual (collective) interests is embodied in the Leninist principle of democratic centralism.

Without democratic centralism in the organization of society and the economy it would be impossible under socialism to consciously manage economic processes, to change national economic proportions in a planned way, that is, to utilize economic laws. The economic laws of socialism cannot be positively carried out in a way other than through the conscious activity of people, and the conscious utilization of laws dictates the necessity for the kind of central organs which would guide the preparation and fulfillment of the over-all national economic plan.

It is not accidental that current revisionists in preaching the idea of "the decentralization of the economy," finish up with conceptions on the spontaneous character of the development of the socialist economy, on the role of the law of value as a regulator of the national economy under socialism. It is known that such views were also expressed by some economists of the GDR and Poland. "If it is correct that economic laws basically determine the economic activity of people," declares the German economist Benari, for example, "and if they operate independently of their will and consciousness, thereby having an objective character, then it is natural that these laws express themselves through the spontaneous activity of people." (9) In this connection

the management of the socialist economy is viewed as an independent adaptation of individual enterprises to the requirements of the market, supplemented by social "economic regulation" through prices, credit, and so forth. "The self-government of the economy," writes the German economist Berens, "is the rational organization of the use of economic laws through the working people at enterprises." And Benari adds this thought: "The self-government of the economy can and must now take the place of the management of the economy by means of a centralized state apparatus." (10) Thus, the socialist economy develops spontaneously and its laws are utilized by isolated enterprises.

Such a treatment of the utilization of economic laws under socialism is fundamentally anti-Marxist. To apply in practice some kind of economic law means to control and regulate the flow of a definite economic, that is, social, process. To utilize economic laws means to administer the social economy, to actively influence the flow of the economic process as a whole. Can the separate individual or collective group (operating in isolation) really substantially influence the course of economic development? Individuals or collective groups may more or less satisfactorily follow the fluctuations of economic activity and adapt themselves to these, but only a more powerful united social force can effectively influence the development of the national economy; under socialism this force is the whole of society led by its vanguard — the working class and its party. The application of the laws of economic and social development under socialism is in its essence a nation-wide matter. Individual members of society and its units play an active part in this only as organic parts of a single whole — the socialist society. From this the necessity for the coordinating and guiding role of the central social and state organs is clear.

Until now we have deliberately separated the question of the need for the existence of a nation-wide center for the leadership of the socialist economy and the question of the economic role of the state under socialism. It was important for us to show the unsound nature of the anarcho-syndicalist revision of the Marxist-Leninist position on the unity of the socialist economy and on democratic centralism as the basic organizational principle of socialism. Now we must emphasize that these are two sides of the same problem. The ultimate aim of the revisionist theories of group property, "spontaneity," and "a decentralized socialist economy" is to "demonstrate" that state property and state leadership of the economy are incompatible with socialism.

It is in this conclusion that the fundamental flaw in right opportunist methodology reveals itself completely: the rejection of the class approach in the analysis of social phenomena and a metaphysical separation of economics from politics. The emasculation of the class nature of the state is one of the chief "theoretical measures" of current reformism and revisionism. The accomplices of the bourgeoisie in the labor movement, on the one hand, treat the essence of the state under capitalism in a bourgeois-liberal spirit, attempting to represent it as a supra-class neutral source which presumably can take account of and reconcile the interests of all strata of the population. On the other hand, as soon as it is a matter concerning the socialist state, the right opportunist ideologists come forward with hackneyed anarchist ideas on the "evil" nature of the state as such and cast aspersions on the state structure of the USSR and other socialist countries.

These ideas have found a highly significant expression in the works of one of the theoreticians of revisionism, R. Ratkovich. In one of his articles he formulates in the following manner two alternative lines of social development

after the victory of the socialist revolution: "In some cases society will take upon itself the function of managing the economy and other spheres of life before the state will be able to take everything into its hands. Society, therefore, will swallow the state before the state succeeds in swallowing society. And where the state has succeeded in doing this, society will have to eradicate its functions one after the other and force the state to disappear." (11) Here is an attempt to contrast society, the people, with the socialist state. Instead of a Marxist-Leninist formulation of the fundamentally new nature of the state under socialism and of the general withering away of the socialist state through its strengthening and development, a far-fetched, false dilemma is presented: who will "swallow" whom. In another article Ratkovich comes to the following conclusion: "State property in the means of production and its management, when carried out by a centralized state apparatus, is the economic ground for bureaucracy and statist distortions..." (12)

The pseudo-socialist critics and "renovators" of Marxism ignore the unquestionable fact that the control of the means of production belonging to the whole people and the utilization of the productive forces of the socialist society are problems which have a class, and therefore, a political character. Therefore, they can be successfully solved in the interests of all of society only through the political leadership of the working class and its vanguard, the Communist Party, with the leadership resting on state power.

In the struggle against the anarcho-syndicalist groups in our party who based their position on the idea that the socialist state and the party should concern themselves exclusively with questions of politics, leaving the solution of economic problems to a "congress of producers," V. I. Lenin revealed how these views were completely hostile to Marxism. Lenin put forward and defended in detail the thesis of the unity of economics and politics under conditions of the transition from capitalism to socialism. This Leninist thesis still retains its significance now in the period of the developing construction of communism. As long as the administration of the social economy affects the interests of different classes and is accompanied by some form or other of the class struggle (either within the country or in the international arena), the state must inevitably combine the functions of political and economic leadership, expressing and defending the interests of the whole of society. It is impossible to establish an absolute dividing line between the economic-organizational and political functions of the socialist state as long as the need for compulsion in carrying out economic construction and in the forcible suppression of anti-socialist tendencies and phenomena in the sphere of the economy has not disappeared, as long as it is necessary to take account of the relationships between two friendly classes — workers and peasants — in solving economic questions, as long as any internal economic questions have any bearing from the point of view of the competition between the two opposed world systems. In other words, under socialism, questions of the leadership of the economy are at the same time questions of political leadership. V. I. Lenin pointed out: "Politics is the concentrated expression of economics... Politics cannot but have superiority over economics... The question stands (and from a Marxist point of view can only stand) thus: without a correct political approach to matters, any given class will not retain its supremacy and therefore will not be able to meet its production task." (13)

As a characteristic example of the anarcho-syndicalist revision of Marxist-Leninist views on the role of the socialist state we may present the following statement of Kardelj:

"Under a regime of autonomy, linked directly with workers' councils and communes, problems of interrelationships between people diminish from day to day. People resorting directly to the solution of problems of combining social and individual interests no longer utilize some sort of class political party. The political party does not meet the needs of the people, it obstructs the development of the people." (14) Here we have a twofold distortion of the problem of combining individual and social interests: first, it is treated as a particularly local problem rather than a social one, that is, as a problem that is presumably solved exclusively in the localities, "in parts," and secondly, as a problem devoid of class, political content. From this follows autonomism and the denial of the leading role of the political party of the proletariat in the development of the socialist society.

Thus, in the socialist society property belonging to the whole people can exist only as state property, and the nation-wide leadership of the economy can exist only in the form of state management on the basis of democratic centralism. The assertion by revisionist theoreticians that they are not against property belonging to the whole people but "only" against state property and state management of the socialist economy represents the fruits of the most complete theoretical muddle, an attempt to disguise with Marxist phrases a complete break with Marxism-Leninism.

The touch-stone of any theory is practice, living reality. Soviet reality clearly confirms the immovable correctness of Marxist-Leninist theory and the insolvency of reformist and revisionist conceptions of the socialist economy. (15) The identification of state property in the means of production belonging to the whole people with state capitalist property, and socialist democratic centralism with bourgeois-bureaucratic centralism, predictions about the presumably unavoidable separation of the socialist state from the masses with state direction of the economy and the fatal "conflict" between such a state and society, false philippics directed at an imaginary "statism," crocodile tears over the "trampling of the individual" in socialist countries — this whole ideological arsenal of current reformism and revisionism is transformed into a heap of verbal fragments as soon as we turn to the real facts of Soviet life and the situation in other socialist countries.

It is highly noteworthy that there is a striking unity between the "arguments" resorted to by both the pseudo-socialist as well as the frankly bourgeois ideologists in trying to provide a basis for their slanderous attacks on the Soviet economic and political structure. Bourgeois economists readily utilize the fabrications of renegades and "renovators" of Marxism concerning state property belonging to the whole people in the USSR and in the people's democracies. The ideas contained in M. Djilas' book, "The New Class," are reshaped in the bourgeois literature and press with particular frequency. Djilas seeks to depict state property in socialist countries as the property of "a new class of bureaucrats." "The communist political bureaucracy makes use of, owns, and is in command of the nationalized property..." (16)

Bourgeois and pseudo-socialist theoreticians attempt to depict the social-economic structure in socialist countries as "state capitalism" or even as "super-capitalism." This is done in two ways. The first is used by the open advocates of capitalism. Their conception consists of defining capital only as the totality of the means of production. Further arguments and conclusions are already contained in the premise. Since in the USSR all the most important means of production, that is, "capital," are state property, this

means that the Soviet state is an "absolute capitalist" who "exploits" the whole population of the country. We find this formulation, for example, in the already cited book by Kelso and Adler, "The Capitalist Manifesto." The authors simply equate socialism and state capitalism. In the USSR, it appears, there exists "a completely socialized capitalism, or state capitalism." (17) With the help of the little word "statization" all differences are eliminated between the state monopolist tendencies inherent in capitalism and the socialist socialization of the means of production, the fact that in becoming social property the means of production under socialism lose the character of material elements of capital is ignored. As we see, in this situation the questions of socializing the means of production and socialism are, generally speaking, impossible in principle. Capitalism in one form or another is the only possible structure. (Which is what had to be demonstrated!)

The other method consists of a disguised variant of the first. Its adherents declare that regardless of the theoretical possibility or feasibility of socializing the means of production, the social-economic transformations carried out in the USSR and in other socialist countries have not resulted in a genuine socialization of the means of production. The liquidation of private property in the USSR and in the people's democracies is treated by these theoreticians as a simple juridical act, as a result of which, according to the declaration of the American sociologist S. Hook, "the most important and traditional property rights of classical capitalism" were inherited by a "bureaucratic state." (18) From this follows the conclusion: state property in socialist countries does not belong to the whole people but is state capitalist property.

The critics of the Soviet economic structure at first ascribe to our party an interpretation of socialist socialization as simple "statization," and then begin to refute their own fabrications, formulating in a scholarly manner, as for example H. Marcus, an "expert on Soviet affairs" did, the following revelation: "Nationalization, that is, the elimination of private property in the means of production, in itself does not introduce any kind of fundamental changes so long as the unification of the economy and control over it are carried out from above and without the participation of the population." (19) But in what socialist country can this kind of "nationalization" be found? Marcus has evidently misdirected his remarks: his formula quite accurately describes the partial nationalization of the means of production which has been carried out in several capitalist countries. In reality, nationalization there has not introduced and could not introduce fundamental changes in property relations since the nationalized means of production, as before, are under the control of the bourgeoisie. But all of this has nothing to do with socialist nationalization.

The classics of Marxism-Leninism emphasized that socialist socialization of the means of production includes as the most important feature the expropriation of capitalists, although it does not consist only in expropriation, that the essence of socialist socialization consists in the establishment of new production relations between people — relations which make it possible for all society in reality to take control of the means of production for its own interests, with the objective of eliminating all possibilities for the exploitation and oppression of man by man. The main task of the proletariat and the poorest sections of the peasantry led by it in every socialist revolution, wrote V. I. Lenin, "is the positive or creative job of adjusting the extremely complex and delicate network of new organizational relationships, including the planned production and distribution of the products necessary for the existence of tens of millions of

people. Such a revolution can be successfully consummated only with the independent historical creativity of the majority of the population, above all the majority of the working people... The main difficulty lies in the economic sphere: carrying out the strictest and most widespread accounting and control of production and distribution of products, raising the productivity of labor, really socializing production." (20)

Marxist-Leninist theory differentiates between simple confiscation and nationalization on the one hand, and genuine socialist socialization on the other.

In building a socialist society in the USSR these Leninist directives were fully carried into life. Soviet reality clearly demonstrates the general public character of socialist property under socialism, the genuine public essence of socialist democracy.

First of all, the means of production in socialist countries are utilized exclusively in the interests and for the welfare of the whole of society, they serve the purpose of the fullest possible satisfaction of the material and spiritual requirements of all members of society. All of this is reflected in the steady growth of the well-being of the Soviet people and the people of other socialist countries.

In 1958 the real incomes of Soviet workers and employees (per capita) doubled as compared with 1940, while the real incomes of collective farmers were more than double the 1940 level. The seven-year plan for the development of the national economy of the USSR in 1959-1965 provides for a 62-65% increase in the national income of the USSR and an increase in the real incomes of workers and employees (per capita) by an average of 40%, and also an increase in the real incomes of collective farmers by at least 40%. According to the seven-year plan the expenditures of the state for social insurance payments, for grants, pensions, stipends for students, for free education, medical services, holiday pay, for the expansion of boarding schools, children's homes, creches, sanatoriums, rest homes, homes for the aged and for other payments and grants to working people will grow to approximately 360 billion rubles. In addition, tremendous resources will be expended for the building of homes, schools, cultural and medical institutions. The task posed by the party and government in 1957 is being successfully fulfilled: to liquidate in the next 10-12 years the shortage of housing and to solve in this way the housing problem. In the last two years alone the urban housing fund has grown by 120 million square meters, while in the forthcoming seven-year period provisions are made for the construction of housing facilities with a total area of 650-660 million square meters, that is, about 15 million apartments. About 7 million homes will be built in rural localities.

The seven-year plan provides for measures to ensure the further improvement of labor conditions, production sanitation and safety technique at enterprises and construction sites through the application of the newest achievements in science and technique in the sphere of making labor conditions healthier. Beginning in 1964 it is planned to initiate the gradual transition of workers to a 35-30-hour workweek. As a result of realizing this remarkable measure our country will have the shortest working day and the shortest workweek in the world.

Secondly, the general public character of state property in socialist countries is reflected in the fact that control over the utilized means of production and over the distributed output belongs to the whole people and is carried out by them through elected central organs as well as directly in the localities and at enterprises.

The democratic principle of organization, Lenin pointed out, means that "every representative of the masses, every

citizen must be put into conditions that will make it possible for him to participate in the discussion of state laws as well as the election of his representatives, and in carrying state laws into life." (21) The management of the national economy, as all social developments, is carried out in the USSR on the basis of these Leninist instructions. The constantly growing democratization of national economic management, the expansion and strengthening of the influence of the working people on the activity of socialist enterprises — these are clear expressions of the general public character of state property in the means of production. The Leninist principle of democratic centralism makes it possible to conduct the national economy according to a single plan, to direct its development from a single center and at the same time to place the development of the economy in the extensive and effective control of the masses of working people.

The measures of the CPSU and the Soviet government to reorganize the management of industry and construction, to expand the rights of republics, local organs and enterprises, to reorganize machine-tractor stations, to improve the planning of agriculture and the further development of the collective farm structure, to activate the work of trade unions and other social organizations irrefutably testify to the expansion of the democratic bases of the Soviet economy, to the development and improvement of socialist production relations resting, above all, on the state form of property in the means of production belonging to the whole people.

"Consulting the people, depending on their collective intelligence and extremely rich experience," Comrade N. S. Khrushchev pointed out in his speech at the 21st Congress of the CPSU, "the party works out and puts into life the most important measures accelerating out movement forward." The 21st Congress of the CPSU, in adopting a grandiose program of communist construction, emphasized the ever-growing importance of developing the initiative, the creative initiative of the masses, their still greater active participation in the administration of the economy and the state. In working out the great plans of communist construction the party turns to the inexhaustible spring of creative energy of the people as the decisive condition for their successful realization.

It is the supremacy of general public property in the means of production in the economy of the USSR and in other socialist countries that makes it possible to ensure a rapid and steady economic development and that determines the fundamental superiority of socialism over capitalism in the rates of growth of production.

In conclusion it is necessary to emphasize that only a Marxist-Leninist treatment of state property in the means of production belonging to the whole people makes it possible to see in proper perspective the means of developing socialist production relations and the socialist state. In the future the two forms of socialist property in the means of production will completely merge into a single communist form of property. In Comrade N. S. Khrushchev's speech at the 21st Congress of the CPSU it was shown that even now there is occurring a gradual rise in the level of socialization of collective farm production and a drawing together of collective farm-cooperative property and of property belonging to the whole people. Indications of the drawing together of the two forms of socialist property are the steady growth of the indivisible funds of collective farms, the all-sided inclusion in the social production of collective farms of all branches of agriculture, the development of inter-farm production ties, as well as the gradual

unification of state and collective farm means of production and the transformation of agricultural labor into a variety of industrial labor.

State socialist property will also become enriched with a new content in being transformed into the communist form of property. This process will be expressed in the further expansion and strengthening of the participation of the widest masses of the people in the management of the economy, in an improvement in the form of general public control over the economy, in the transition from socialist equality to communist equality to the extent that essential differences are eliminated between mental and physical labor, between the city and countryside, as well as to the extent that the prerequisites are created for the transition from distribution according to labor to distribution according to needs.

Together with the growth and strengthening of the basis of socialist society there will also occur a development of the socialist state: the socialist state structure will gradually develop into communist social self-government. "The chief direction in the development of the socialist state structure," N. S. Khrushchev pointed out in his speech to the 21st Congress of the CPSU, "is the all-round development of democracy, the involvement of the widest sectors of the population in the administration of all the affairs of the country, the involvement of all citizens in taking a part in the leadership of economic and cultural construction."

The withering away of the state in Marxist-Leninist thought does not mean, despite the reformist and revisionist conceptions, the elimination of the organs of centralized leadership of the economy. The state as a political organ, as an organ for administering people, will of course wither away in time. But its economic-organizational function will be inherited by a definite social organ of the administration of the communist national economy which will administer things, although the character and methods of performing this function will change insofar as it will lose its political character and will not be connected with any forms of compulsion. This organ, in the name of and under the control of all of society, will regulate its economic life. The administration of the national economy, as before, will be based on the principle of democratic centralism, which is inseparable from property belonging to the whole people, requiring, on the one hand, unity and a clear-cut scientific coordination of the activity of the whole of society, and on the other hand, the maximum creative activity and initiative of every individual member of society and every unit of society.

The 21st Congress of the CPSU, in posing the great tasks of the seven-year plan which fully expresses the general public character of state property and the democratic nature of the Soviet state, and in introducing a new wonderful contribution to the Marxist-Leninist theory of socialist property, has struck a shattering blow at the "critics" of the Soviet economy, at the apologists for capitalism.

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DISCUSSIONS AND DELIBERATIONS

S. Pevzner:

Specific Problems in Amortization of Fixed Capital in Various Branches of the National Economy

The fixed capital of various branches of the national economy of the USSR include, on the one hand, objects that are more or less homogeneous in terms of their functioning in the process of production, and on the other hand, objects with a variety of specific conditions of operation. This has to be taken into consideration in the elaboration and introduction of new amortization standards. For all objects of labor homogeneous as to their functions in the process of production but installed in different branches of the economy, although the conditions of operation are identical or similar, and consequently service life is identical, unified standards of amortization should be established both for replacement calculations and for major overhaul.

The bulk of production and service buildings of identical life span and of identical materials of construction should be classified in this category. Also in this category there should be placed certain types of structures erected of identical building materials (for example, smoke stacks, surge tanks, bridges, the beds of railroads and highways, wells, etc.). This category should also include homogeneous types of equipment as well as of tools and business equipment.

Differentiated amortization schedules based on consideration of the specific conditions of operation in various branches of the national economy should be established for that type of fixed capital which is sharply differentiated from the former type in terms of functions and wear. These specific features may be conditioned by natural factors typical of certain branches of the economy, and by special features of the process of production related thereto (the technology and organization of production, peculiarities both of environment directly involved in production and the general environment, in which objects constituting fixed capital are found).

The various special features of the conditions in which independent groups of items of fixed capital function lead to differences in service life, in the periods and scale of major overhaul, and therefore in the standards of amortization.

The specific nature of agriculture as a branch of the national economy is expressed, for example, in the fact that a number of types of fixed capital (various tree plantings, working and production livestock) do not undergo physical deterioration over a long period of existence, so that the amortization scales do not require the provision of a special portion for major overhaul. Further, conditions of soil and climate, which affect the service lives of machines in various parts of the Soviet Union, also play a major role in agriculture.

Specific peculiarities of utilization of certain types of fixed capital exist in the railway, maritime, river, and truck transport industries. These specific features, induced by special conditions of operation, reflect themselves in the service life, and consequently in the standards of

amortization of this type of fixed capital. Likewise, industry, too, has a group of branches with specific features of production that affect the service lives of fixed capital and consequently the amortization rates. Thus, in the raw material producing industry (petroleum, coal, shale, asbestos, ore mining, etc.) the reserves of useful minerals in the given deposit have a great deal to do with the service life of substantial portion of the fixed capital. As concerns hydroelectric stations, objects of so-called "eternal duration" are typical, and this reflects itself upon the total standard of depreciation of fixed capital in hydroelectric stations. Finally, in addition to the general factors entering into the wear of machinery and equipment (mechanical wear, fatigue, heat wear, etc.) which affect the service lives of machines and mechanisms in the machinery manufacturing and metal working industries more than in other branches, the types and forms of organization of production are greatly varied, embracing single unit, small serial, large-scale serial and mass production, multi-purpose automatic lines, and entire departments and plants, all of this also effecting the service life of machines and machine tools.

All these special features have to be taken into consideration in elaborating new standards of depreciation. Moreover, all fixed capital should, as a rule, be subject to amortization.

In connection with the fact that livestock and vegetation enter into the fixed capital of agriculture, some exceptions from the general rules have to be provided in the amortization of fixed capital in this branch of the economy. Thus, young plantings of trees for forestry, fruit and berry, and shelter and drainage purposes, have not yet reached the stage of bearing fruit, and are thus not subject to deterioration. Their use value and exchange value does not diminish with time, but increases inasmuch as, after planting, they still require considerable outlays of labor (to combat pests, for irrigation, trimming, etc.). Therefore, they are also not subject to amortization.

Young fruit-bearing plantings are part of fixed capital from the time they are planted, but they are subject to amortization only from the time that they start to bear fruit. Amortization of shelter belts should be calculated from the time the crowns of the trees meet, and other types of plantings should begin to be amortized from the time they are turned over for use. However, this is not done in practice. Presently, the state farms under the Ministry of Agriculture of the USSR alone have various types of plantings to a total value of nearly a billion rubles, and the collective farms have plantings worth nearly 2-1/2 billion rubles. A considerable proportion of the acreages under young shelter and drainage plantings are annually included in the category of fixed capital subject to exploitation. However, no standard amortization rates have been established for all these types of fixed capital, and therefore neither the planned calculations nor the actual costs of production of the state farms show any entries for amortization of plantings. This is the situation that exists in another field as well, that of what is termed non-inventory expenditure: for stumping, for fundamental improvement of tracts of land, etc. Here too, there is as yet no economically justified method of making good capital investments by the government for these purposes by means of gradually transferring them to the cost of agricultural produce. All of these shortcomings require

correction.

We are in favor of the proposal advanced by D. Vasilyev to the effect that standards of amortization should be set at 1-4% of the initial cost of these types of fixed capital, depending upon the nature of the land improvement tree plantings. For so-called non-inventory fixed capital it would be desirable to set amortization periods equal to one cycle of rotation of the major crops of the state farm. (1)

Since 1942, no deductions for amortization are made on state farms for adult producing cattle (cows, pigs, goats, sheep, blooded horses), despite the fact that they are tools of labor and are part of the fixed capital of socialist enterprises. This is justified by the fact that the livestock fields are witnessing a process of natural restoration of the productivity of this type of fixed capital, and therefore, after they enter into the process of production and yield products over a comparatively lengthy period of time (relative to the total term of utilization of the given type of livestock), productive livestock not only do not lose but even gain in value. The weight on the hoof of productive livestock at the moment when they are chosen from the standing herd is greater than their weight when they enter this herd. The same holds in feed lot procedure. Therefore, the liquidation cost of productive cattle upon realization of this value (by slaughter or elimination from the herd) is held to be equal or almost equal to its initial cost at the moment of acquisition or at the moment it is considered part of the basic herd.

We think that this situation was appropriate in the period when the state farms had little high output cattle or blooded cattle in general. Today, however, when in virtually all state farms and many collective farms the yield and the blood lines of cattle have sharply improved, the absence of amortization deductions from the cost of the adult productive cattle is not justified. All beef and dairy cattle will, at the end of some specific period, lose their value and use value. If cows begin to show a reduced milk yield, or none at all, at some specific year of their lives, or if after a definite period sows cease to yield litters, their value and use value is sharply reduced. However, the high-output breeds of cattle which now predominate in state farms have a greater value (and price) when they enter the permanent herd in view of their improved qualities and properties as compared to cattle of low output and of non-descript breed. After feeding-up and slaughter, the cost of any type of high-yield cattle is equal only to the cost of the meat at which it is sold. The special properties and qualities of high-yield cows or sows are not taken into consideration therein, nor is their meat sold at higher prices, despite the fact that these special properties and qualities were attained as a result of substantial outlays of labor. Numerous facts demonstrate that state farms suffer considerable losses on the sale of high-yield livestock culled from the permanent herd (cows, pigs, goats and sheep, blooded horses), and this leads to a reduction in their capitalization. In 1956 alone, the state farms lost more than 225 million rubles by the sale of cows for meat. Moreover, due to the absence of deductions for amortization, the costs of production of state farms with respect to dairy cattle were understated by 305 million rubles in that same year of 1956, or by more than 11 rubles per centner of milk. For the same reason, horse farms obtain only 25-30% of the cost of blooded horses, considering the value at which they were placed on the books when placed in the permanent herds of these farms, upon sale of such horses.

In the light of the foregoing circumstances, it is necessary to re-establish amortization of all meat and dairy livestock and blooded horses. Moreover, it should be

observed that at the present time meat and dairy livestock in state farms is not subject to government insurance against epizootics and death due to natural calamities, diseases, etc. Some economists have suggested that this factor be made compulsory in determining standards of amortization for beef and dairy livestock. We think that this suggestion is incorrect. To calculate amortization of beef and dairy cattle belonging to state farms with allowance for a factor providing for possible losses due to epizootics, accidents and natural calamities or due to unavoidable slaughter for the purpose of bringing epidemics to an end is out of the question. The unavoidable losses occurring in these cases should be covered not from the funds for amortization but from insurance funds or out of the national income (that is, from the accumulation of profits of the state farms).

In elaborating and determining the new standards for deductions for purposes of amortization of the fixed capital of railway, inland waterway and maritime transportation, as well as for municipal services, it must be born in mind that this kind of fixed capital is distinguished by an extreme degree of variety as to type and as to the methods by which its costs are repaid.

In 1940, in preparing the data with regard to new amortization standards for the fixed capital of the People's Commissariat of Railways, the following four groups of fixed railway capital were distinguished, each of them having their own specific features:

(1) Fixed capital requiring that both the initial cost and the cost of major overhaul and periodic overhaul (rolling stock, buildings, fueling structures, the equipment of locomotive and car repair shops, stations, ships, cutters, etc.).

(2) Fixed capital the initial cost of which does not have to be made good, it being only the cost of major and periodic overhaul that has to be amortized, if this is provided for by the instructions of the Ministry of Railways now in effect. To this group were assigned items characterized by a service life of indeterminate length. When items of this kind undergo major overhaul, what occurs is a gradual replacement of the various structural elements or parts, the result being that the entire structure is continually being renewed. Items in this group were, in turn, subdivided into the following sub-groups:

(a) Fixed capital of "eternal life," the amount of depreciation and therefore the replacement costs of which are virtually zero, so that the books need consider only repair costs. Structures of this kind include: tunnels, galleries, railway and masonry bridges, etc. (dams, canals, docks, locks, reservoirs, and other hydraulic engineering structures are assigned to this category with respect to internal waterways and maritime transportation).

(b) Structures (for example, the railroad right-of-way, water supplies and sewage systems), consisting of heterogeneous elements, a portion of which (for example, the bed) is never replaced, while the others are replaced only as part of major overhaul (rails, points, sleepers, ballast, etc.).

(3) Fixed capital never requiring major repairs, so that only replacement of initial cost has to be allowed for. This group of fixed capital was set up for electric cable, snowsheds and working livestock. Major overhaul of power cable and snowsheds is never performed, all necessary repairs being done in the course of current maintenance.

(4) Fixed capital not then and not presently subject to amortization either of initial cost or of the cost of major repairs, as no such repairs are carried out. In current practice, libraries and beef-and-dairy cattle fall into the last named category.

In our opinion, this last group should never have been set up. Books and charts could very well be assigned to the second group of fixed capital with respect to which only the cost of major repairs have to be made good. As far as meat-and-dairy livestock are concerned, they should be included in the third group in view of the fact that they must also be covered by amortization for replacement costs. Nor can one agree that the structures of "eternal life" should be set up as a special category not requiring that their initial cost be made good. Any citation of Marx in this connection is unjustified, because Marx, in discussing the amortization of objects of so-called "eternal life," and referring to Lardner (2), merely generalized the practice followed in England in the middle of the 19th century. At the present time, amortization deductions are made in virtually all capitalist countries both for the initial capital invested in structures having "eternal life," particularly railway bridges, roadbeds, tunnels, overpasses, etc.; despite the fact that these structures physically are of "eternal duration," economically they lose their use value, and consequently their value, in comparatively short periods. Suffice it to say that in the United States, the result of the competition of parallel railway lines as well as that of automotive transport resulted in a reduction in the total length of railways from 409,000 kilometers in 1916 to 357,000 kilometers in 1954. In other words, the conditions that Lardner wrote about a hundred years ago no longer obtain.

Of course, in socialist society all the factors that cause premature devaluation of structures of "eternal service life" under capitalism do not apply. However, here too, it is impossible, without amortization, correctly to calculate the cost of railway, merchant marine and inland waterway transport, to perform comparisons of the economic efficiency of capital investments in various types of transportation, to make the best possible selection of a variant of a designed project for the construction of railways, maritime and inland waterway hydraulic engineering structures, etc. Moreover, as no objections have been raised against the amortization of masonry and reinforced concrete buildings and structures used for industrial purposes and of housing, the service life of which has been set at 150-200 years, one can hardly present objection to the amortization, for example, of railway roadbeds, the service life of which may be designated as approximately 200 years, or dams, the service life of which may be taken to be 300 years.

Each of the groups of fixed capital of railway, maritime and inland waterway transportation and of municipal services referred to above should have its own individual standards of deductions for amortization. Proceeding from the share of each type of fixed capital in the over-all total thereof and from the individual standards of amortization, it is easy to set up a single combined amortization standard for all types of fixed capital of railway, maritime and inland waterway transportation and of municipal services, with earmarking therein of the share to cover major and secondary repairs.

In connection with the specific nature of automotive transport, consisting of the fact that the wear of trucks results chiefly from the mileage they cover, all trucking enterprises on a cost accounting system have, since 1945, made monthly deductions both for rebuilding and major repairs to rolling stock and to individual assemblies therein on the basis of rigid equal standards for every thousand kilometers covered. This has been based on data as to the actual mileage done by trucks and trailers. In 1956, these standards were tied to the model of the equipment used, the type (trucks, passenger, buses or trailers) and the service

conditions. The result is, in our opinion, that the present system of amortization of automotive vehicles suffers from a number of shortcomings.

The most important of these is the fact that truck and passenger vehicles and buses, as well as trailers, are amortized on the basis of a single index — the number of kilometers covered. If it is true that this index is satisfactory for passenger cars and buses, it does not meet the situation with respect to trucks and trailers, as it does not make allowance for the intensity with which equipment is used. However, we know that the greater the load carried by an automotive vehicle, the more rapidly its major parts wear out: cylinders, engine, chassis, pistons, etc. Therefore, as concerns trucks (and trailers), the quantity of which exceeds that of passenger cars and buses in the USSR by a ratio of 5 or 6 to 1, it is necessary to set two standards of amortization: one based on the number of kilometers run, reflecting the extensive side of their operation, and the other relating to the ton-kilometers of mileage reflecting the intensity of their utilization in service. The basic standard for amortization deductions should be one based on ton-kilometers, and not on mileage, because amortization as one of the most important components of the costs of production in automotive transport should include, in cost measurements, the actual units in which haulage is done. Only the ton-kilometer can serve to provide the most nearly correct reflection of the volume of useful work performed by truck transport. Standards based on mileage should be used as supplementary standards for deadheading, which can be identified from records.

Another shortcoming of the current standards for amortization in automotive transport is the fact that they provide an equal sum deduction per thousand kilometers run. However, it has been demonstrated that there is no strictly linear relationship between the work done, the mileage covered and the wear on a vehicle, but that wear increases less rapidly than does mileage or the useful work in the hauling of freight done by the machine. From this we draw the conclusion that the standards of amortization deductions must be reorganized on the basis of a sliding scale. One standard of amortization should be established per thousand kilometers run in the 1,000-25,000 kilometer interval, a second in the 25,000-50,000 interval, a third in the 50,000-100,000 kilometer interval, etc. The same principle should be applied to the standards of amortization for ton-kilometers done.

P. Filippov points out, quite correctly, that automotive fleets contain a category of machines to which the mileage or ton-kilometer principle of amortization does not apply at all. (3) What he has reference to is specialized trucks for the delivery of milk, liquid oxygen, etc., as well as trucks carrying special equipment (truck cranes, fork-lift trucks, compressors, mobile repair shops, etc.). The total annual mileage covered by all these specialized types of trucks is very small, and the amount of time spent at a standstill is very great. Therefore, years of service, and not mileage or ton-kilometer freight haulage, would constitute a desirable type of basis for the amortization of all such categories of specialized automotive transport. Current practice indicates that, under the existing amortization system, vehicles scrapped because of obsolescence and wear have not been fully amortized by any means. This is explained by the fact that the deductions for amortization are considerably less than the actual physical wear.

Let us now turn to the special features of amortization of fixed capital in various branches of industry.

Two groups should be distinguished among the various types of fixed capital in enterprises of the raw-materials

producing branches of industry (petroleum, coal, shale, asbestos, ores, etc.):

(1) Those whose life is related to the size of the resource of the mineral and other products in the depths of the earth, for example, petroleum reserves, coal available within a single mine field, etc., and,

(2) Those not affected by the exhaustion of reserves of minerals in a given locality. The first category of fixed capital includes capital expenditures for all types of mining, for drilling, for surface operations, for structures required in mining engineering, and for office buildings. The second group of fixed capital includes a considerable portion of the equipment, the measuring and monitoring instruments, transportation, tools, and inventory.

The first category of capital expenditures, which constitutes the bulk of the costs, is strictly localized and related to the particular deposit, and should therefore be amortized within the period of time that the resources present are utilized or exhausted. This is explained by the fact that after a deposit has been exhausted completely or to such a degree that industrial working becomes unprofitable, a substantial portion of these elements of fixed capital, such as oil wells, mine shafts, galleries, major mine workings (such as primary drifts, slopes, ramps, bores, crosscuts, etc.), buildings used both for offices and for productive purposes, particularly buildings established in connection with mines and shafts, lose their value virtually completely or retain a negligible portion of their value.

The other portion of the capital expenditures, consisting chiefly of the costs of equipment, portable structures such as drilling towers, monitoring and measuring instruments, etc., should be amortized independent of the service life of oil wells, coal and ore mines, etc., as, when these wells and mines are liquidated, this equipment can be transported to another site and there amortization can continue until normal service life has been exhausted.

In view of the exceptional importance of such a factor as natural geological conditions determining the capacity of an oil field, a coal or ore mine, and influencing the service life of the overwhelming bulk of the fixed capital of enterprises in the primary extraction industries, let us devote more time to this question.

Take the oil industry. In this branch of industry we encounter the phenomenon of reduction in petroleum yield with each year in which a well is used due to reduction in stratum pressure in the area being worked. In this connection, the standards of oil-well amortization introduced by an order of the Fuel Section of the USSR State Planning Commission, dated April 23, 1927, and in effect until 1939, provided for the depreciation of these funds at a changing rate, or in other words a declining scale of amortization was employed: for example, 30% of the costs during the first year of operation at Baku, 25% in the second year, 20% in the third year, 15% in the fourth, and 10% in the fifth, each pertaining to the initial cost of oil wells. The total length of time during which fixed capital was written off in the other oil organizations of the USSR was four years.

As of January 1, 1954, a 15-year period for the exploitation of oil and gas wells was established. In this connection, the standard of amortization of all oil and gas wells in the USSR was set at 6.7% per year, not counting special deductions for major overhaul. The wear of wells is arbitrarily taken to be uniform during the course of their service life. Changes in petroleum recovery are not considered. This is justified by the facts that today a considerable equalization of the rate of petroleum recovery has taken place as compared to the past, inasmuch as modern

methods of acting upon oil-bearing strata by means of flooding within and outside the stratum create favorable circumstances for uniform oil production, and consequently for amortization deductions.

However, at the present time, the writing off of the initial cost of an oil well is performed regardless of whether the well is actually in operation or not. Thus, amortizations are deducted even if the oil well has been liquidated prior to the 15-year term of exploitation. This should be deemed improper, for the following reasons. In the first place, liquidated wells, having lost their use value thereby lose their value, inasmuch as there is nothing from which to transfer value to the product created in the course of production, more so as no petroleum is recovered from these wells. In the second place, when the average service life of any type of fixed capital is calculated, one always has in mind that certain items of the given type of fixed capital will go out of operation earlier than the calculated amortization period, while others will survive past this average write-off period. Consequently, shortages in amortization of the initial cost of oil wells that have gone out of operation prior to the 15-year write-off period will be covered by the increase in accumulations on the part of petroleum organizations out of wells continuing to operate after the fifteen-year depreciation period and continuing to yield petroleum whose cost no longer includes amortization deductions for purposes of replacement.

In the coal, shale and ore mining industries, where various areas will present limited reserves of coal, shale, and the ores of the ferrous and non-ferrous metals, the service life of fixed capital of strictly local utility (mines, tunnels, other workings, etc.) is in inverse proportion to the annual output of the mine. However, if the reserves of coal, ore or some other mineral are boundless, and we are dealing with underground workings, the service life of the coal or ore mine and of other fixed capital of local utility may be determined on the basis of logical considerations, regardless of the rate of output, and there is no need to increase it excessively. It is desirable that the service life be as short as possible, as this assures speeded turnover of fixed capital. However, there should be no effort to design very short periods of service life for coal or ore mines (for example, under 20-25 years), as this would increase the total sum of annual deductions for amortization and would thus lead to an increase in the cost of the coal or ore being mined, when one considers that the sinking of each shaft or mine is also an item running into the millions of rubles.

Metal-working machine tools are employed in all the branches of the economy of the USSR. In addition to factors of wear common to all machines in the form of mechanical, fatigue and thermal deterioration, metal creep and corrosion, these machine tools are subject to various degrees of wear in accordance with their characteristics and the forms and types of organization of production in the machinery manufacturing and metal working branches of industry.

Experience has shown that heavy machine tools have longer service lives than light machine tools weighing less than one ton (this difference is 100% to 150%). Therefore, the standards of amortization for equipment must be adjusted to the weight of the equipment, even if the process of production is absolutely identical. Moreover, the length of time elapsing between major overhauls, and the cost of major overhauls are completely different for light weight and medium weight metal-cutting machine tools, than for heavy and unique and extra heavy machine tools. Thus, the cost of major overhaul for universal lathes, column-

and-knee milling machines, vertical drills and other light and medium weight machine tools is 40-45% of that of a new machine tool, while major overhaul of heavy and unique machine tools is 12-15% of the cost of the new one.

The degree of wear, and consequently the service life of metal-working machine tools is influenced by the organization of production and by the production process in the given enterprise, the degree of mechanization and automation thereof, which govern the share of machine time, i.e., the time during which the machines are directly engaged in operation during a shift. Thus, investigations by the Experimental Research Institute for Metal-Cutting Machine Tools conducted a number of major enterprises of the principal branches of the machinery manufacturing industry (in Moscow, Leningrad, Kharkov, Minsk, Lipetsk) permitted the following conclusions to be drawn. At plants where production is of single units or where small-scale serial production occurs — and, as distinct from other branches of industry, there are very many such plants in the machinery manufacturing industry (turbine building plants, enterprises manufacturing diesel and electric locomotives, as well as those making electrical machinery) — the time during which metal is cut in the course of the machining of parts on lathes, turret lathes, cylindrical grinders, radial and vertical drills does not exceed 30-40%, while on heavy horizontal borers it is no more than 15-20% of the total outlay of working time. However, under conditions of large-scale serial and mass production (at ball bearing and tool and fastener plants, etc.), the time required during which these machine tools are engaged in cutting metal is 53-65% or even as much as 70% of the total working time (for example, this is the case with automatic multiple spindle rod turners). (4) At many machinery manufacturing enterprises, forging and pressing equipment is used to a very limited degree, so that machine time is only 7% to 20% of the total outlay of working time.

When production undergoes all-around mechanization and automation, permitting a sharp reduction in the time spent in auxiliary operations and in the servicing of the machine tool, the productivity of all types of metal-working machine tools may be increased by 30-40%. On automatic lines which are currently being introduced extensively at large plants engaged in metal working and the manufacture of machinery, machine time may be increased to 95-100%, as all the auxiliary, preparatory and finishing, and monitoring operations are mechanized and automated.

Naturally, the difference in percentage of machine time to work shift, which gives rise to differing degrees of wear, must be reflected in amortization standards. The lowest amortization standards for equipment should be set for machinery manufacturing enterprises engaged in making single machines and in small-scale serial production (where the wear of equipment is lower than average); higher standards should be set for large-scale serial and mass production, and the highest standards for completely automated production on automatic and conveyor lines of machinery manufacturing and metal working enterprises showing the highest rate of deterioration of equipment. Moreover, increased amortization rates should be set for machines and machine tools used for high speed and forced regimes of cutting, which increases wear, and consequently reduces service life or requires more frequent performance of medium and major repairs.

It must also be borne in mind that the standards for amortization of metal-working equipment developed with due consideration of all the different types of organization of production and of the manufacturing process referred to above must also vary in accordance with the number of shifts

working at the given enterprise and with the percentage of the work done in each shift, as provided in the amortization standards approved by the National Economic Council of the USSR in 1930.

In connection with the fact that a large number of large, medium sized, and small hydroelectric stations are in operation in the USSR, we must pause to consider the specific features of amortization of fixed capital in these power producing enterprises.

A large portion of the structures comprising the fixed capital of hydroelectric stations belong to the category of so-called "eternal" fixed capital, and this is the distinctive peculiarity of hydroelectric stations. Every kind of earth and concrete dam, dike, canal, basin, tunnel, aqueduct, channel, sluice, and reservoir bed constitute structures which deteriorate very slowly. Under the conditions of mid-19th century capitalism, it was not deemed necessary to return the capital advanced for the construction of such "eternal" structures, and only the annual average costs of keeping the structures in working order and the costs of current maintenance were transferred to the cost of the products. However, in Soviet practice, the costs of production of hydroelectric stations are designed to include not only expenditures upon current repairs but also those of amortization both for replacement and for major overhaul of such hydroelectric structures.

The existing standards of amortization for hydroelectric stations provide not only simple but expanded reproduction. This is explained by the fact that in the total cost of all the fixed capital of hydroelectric stations, the cost of hydraulic structures of "eternal strength" is about four-fifths of the whole, and the cost of equipment is about one-fifth of the whole. Therefore, the main component in the total sum of amortization of hydroelectric stations is the amortization of hydraulic structures. The established rate of amortization for replacement (2.3%) is several times as great as the actual physical deterioration of hydraulic structures. A great many hydraulic structures (earthen, concrete and reinforced concrete dams, reservoirs, canals) have service lives of indeterminate length. Moreover, the periods that elapse between major overhaul of many structures is also very great (that of locks, is for example 20 years, and that of dams and channels is even greater). Moreover, in the construction of hydroelectric stations, problems of power production, transportation, irrigation, drainage, and ship traffic are almost always considered in conjunction with each other. As a result, when hydroelectric stations are built, major capital outlays are made not dictated by the needs of the construction of the hydroelectric station as such (for example, provision of locks, ship canals, irrigation canals, conduits, railway bridges, etc.). However, after completion of the construction of a hydroelectric station, the cost of all or of a majority of these multi-purpose hydraulic engineering structures is transferred, under existing rules, to the books of the hydroelectric station, and this also results in an artificial increase in the amortization rates of hydroelectric stations and accordingly, in the cost of the power they produce.

To reinforce the principles of cost accounting, the deduction of amortization per hydraulic engineering structures not only for purposes of major overhaul but for replacement is correct, inasmuch as cost accounting requires the maintenance and return not only of circulating but of fixed capital both in kind and in value. Moreover, amortization as a major element in cost, particularly so at hydroelectric stations, should be represented in cost in its true dimensions. Otherwise, we will not be in a position to compare the cost of a unit of electric energy (one kilowatt hour) produced at

hydroelectric stations, with its cost at various thermal or atomic power plants and to learn the economic efficiency of the capital investments, reconstruction, modernization, etc., thereof.

However, in the interest of obtaining the true cost of the electric energy produced by the hydroelectric stations where amortization constitutes, according to report data of 1955, as much as 70% of the total cost of electric energy at all government-owned hydroelectric stations (5), the following is necessary:

(1) Capital investments and operating expenditures for power production and for inland water shipping, irrigation and transport must be calculated separately as early as the stage of planning of new hydroelectric stations, when they are to be for the purpose of many-sided utilization of water resources in power production, shipping, irrigation, and transport.

(2) In the process of construction, in addition to taking steps to reduce the cost of the very process of production, it is necessary to allocate capital expenditures correctly to the various branches of the economy that will engage in exploitation of various portions of the totality of hydraulic engineering structures being erected. This makes it possible, subsequently, to carry out a correct procedure in deductions for amortization for the corresponding products and services — electric power, river and railway transport, and farm produce. Under these conditions, in connection with the very long terms of service of hydraulic structures and the long terms elapsing between major overhauls it is, in our opinion, necessary to cut the existing standard of amortization by not less than one-half or two-thirds, as it does not correspond either to the needs of replacement or to the needs of capital repairs of hydraulic structures.

Literature Cited

- (1) See: *Sovkhoznoye proizvodstvo*, No. 12, 1957, p. 15.
- (2) See: *Karl Marx, Capital*, Volume 2, 1955, p. 177.
- (3) See: *Planovoye khozyaistvo*, No. 8, 1958, p. 61.
- (4) These data pertain to the work of the machine tools during the first shift. During the second and third shifts the coefficients of machine tool utilization are lower by approximately 20-30%.
- (5) See A. Ya. Avrukh: *The Cost of Electrical and Heat Energy*. Government Printing Office for the Power Industry, 1957, pp. 124-125.

A. Andreyev, N. Skolkin:

New Draft Standards for Amortization Deductions in Ferrous Metallurgy

The fixed capital of the iron and steel industry, or mining, coke chemicals and refractory industries built up during the years of the founding of the basis for socialism in material technology is valued in today's prices at up to one hundred billion rubles. However, this capital is carried on the books of enterprises at monetary valuations that are nominally identical but actually differ. For example, the fixed capital of the Kuznetsk integrated iron and steel mills, including a number of blast and open hearth furnaces, blooming and rolling mills, a coke-chemical plant, an extensive ore mining enterprise, were valued in 1958 at 2,335,000,000 rubles. The fixed capital of the Zaporozhstal mills, the total

capacity of which is less than that of the Kuznetsk mills, was valued at 2,424,000,000 rubles in the same year, or in other words at more than the fixed capital of the Kuznetsk mills.

In accordance with a resolution of the USSR Council of People's Commissars of January, 1938, with subsequent amendments, deductions for amortization at enterprises in the iron and steel, or mining, coke-chemical and refractory industries are based on the initial book value of the fixed capital, without consideration of the period in which and the circumstances under which the enterprise was established. As a result, amortization deductions in terms of the cost of one ton of conversion pig iron amount to 4.5-6 rubles in the mills in the south, while they do not exceed 2 rubles at the Magnitogorsk and Kuznetsk mills. In the cost of one ton of ordinary open hearth carbon steel at the mills of the south they represent 6-9 rubles, while at the Magnitogorsk and Kuznetsk mills they are 2-3 rubles. Amortization deductions represent 3 rubles 59 kopecks per ton of first grade rail at the Kuznetsk mills, 17 rubles 65 kopecks at the Azovstal mills, 27 rubles 65 kopecks at the Novo-Tagil mills, although the volume of production at the three rail and beam mills of these plants is virtually identical. This is explained by the fact that the rail and beam mill of the Kuznetsk plant, started in 1933, is kept on the books at 61,300,000 rubles, while that at the Azovstal mill, which went into operation in 1949, is rated at 250,900,000 rubles, and that of the Novo-Tagil mill, which went into operation in 1950, is valued at 365,900,000 rubles.

Therefore, the cost of pig iron, steel, and rolled metal often is reflected inaccurately in the book value of a certain portion of the fixed capital which does not correspond to the present-day cost of the reproduction of this capital, and the outdated standards of amortization deductions which do not take into consideration the contemporary engineering level of production and the preservation and reproduction of fixed capital in the iron and steel, the ore mining, the coke-chemical and the refractories industries are not properly provided for.

To assure reproduction and preservation of fixed capital, and of a proper and justified allowance for costs of production and in order to reinforce cost accounting, the cabinet of the USSR has ordered a revaluation of the fixed capital in the economy in accordance with present costs, and the elaboration of new standards of deductions for amortization that would assure rebuilding and major overhaul of fixed capital with consideration for intensity of utilization and obsolescence of equipment.

The elaboration of the draft plan for the new standards of deductions for amortization in the iron and steel industry, the coke-chemical industry, the refractories and ore mining industries, is being performed by the Iron and Steel Industry Central Research Institute (TsNIChermet). It has gained the assistance of departmental institutes — the Ukrainian Metals Institute, the Tube Institute, the Giprokoks, Giprostal, the VNIIOChermet, and the Refractories Institute, as well as the economics departments of the Magnitogorsk ore mining, the Dnepropetrovsk iron and steel and the Krivoi Rog ore mining institutes. The work toward drafting the new standards of deductions for amortization was performed in two stages. First research material was accumulated on the service lives of items of fixed capital. Now, the draft of the standards is being compiled in accordance with the instructions of the USSR State Planning Committee as to method.

The standards for amortization deductions should reflect, in consideration of the value of the total social product, that portion of the value, which is continually transferred by

means of labor to the product as a result of the utilization of the former at the average rate at which use value is lost. This average standard, as we know, is measured by the average period during which the means of production are used from the moment when they go into production to the moment when they are completely worn out and become useless. Moreover, the length of time during which objects of labor function depends upon technological progress, which leads to the replacement of obsolescent means of labor earlier than planned.

Therefore, work toward the preparation of a draft of new standards of deductions for amortization requires, in the course of determination of service life as the basis for the standards, consideration not only of the achievements of technological progress, but of the prospects of technological progress in the years of progressive upbuilding of communism that lie ahead.

According to the amortization standards established by order of the Council of People's Commissars of the USSR in 1938, the service life of fixed capital as a whole for all industry under the People's Commissariat of Heavy Industry was set at 31 years, with the proviso that partial replacement occur in the form of major overhaul to a total of 2.4% per year of the value of this fixed capital. If allowance be made for the existing procedures for amortization deductions at industrial enterprises, and in particular in heavy industry, based upon the differentiated standards under the order of the Council of the National Economy, the service life decided upon for the active portions of fixed capital such as working machines and equipment was set at 20 to 25 years. Fulfillment of the objectives of the seven-year plan, envisaging fundamental reconstruction, expansion and technological re-equipment of enterprises, substantial replacement and far-reaching modernization of equipment will result in accelerating the process of ageing of equipment, and this will reduce service life. This dictates somewhat of a reduction in write-off periods with allowance for the increase in the rates of technological progress in the years ahead.

The TsNIChermert has developed a method of determining the service life of specialized fixed capital in the iron and steel industry, has tested it in the open hearth and sheet rolling departments of the Hammer and Sickle factory at Moscow and has offered it for large-scale discussion by specialists in the field. The TsNIChermert method was taken as the basis for investigations conducted during 1958

and the first quarter of the present year by certain institutes and organizations at iron and steel and coke-chemical enterprises, and at plants of the refractories and ore mining industries.

The TsNIChermert method is based upon the following principles. First, all research is conducted within the existing system of accounting of fixed capital. Second, the research work is developed for modern and not obsolete machines and equipment. Third, in determining the service life, major overhaul is regarded as a form of partial, detail-by-detail replacement, required to assure that the total complex of means of labor continues to function for the expected period.

At enterprises in the iron and steel industry and its suppliers, accounting of fixed capital is conducted on the basis of the items carried on the inventories, including structural engineering objects, and the object or combination of objects designed to carry out the specific functions that are peculiar to this item.

However, arbitrary decisions have been made in some places because of the inadequacy and the non-specific nature of methodological guidance, and the absence of precision in definition of inventory items as the fundamental and primary unit of analytic analysis. The card files for the analytic accounting of fixed capital at such iron and steel mills as Zaporozhstal, Azovstal, the Dzerzhinsky, and the Magnitogorsk integrated mill list tens of thousands of inventory items, and hundreds or even thousands of items in the major iron and steel departments. The card files for individual plants show, side by side, inventory items such as a blast furnace (which costs 17 or 18 million rubles), a high capacity electric traveling crane (which costs several hundred thousand rubles) but items of little value, such as a shed for loaders (2,000 rubles), and elevator foundation (2,500 rubles), etc. Nevertheless, the data of the plantwide bookkeeping accounts of fixed capital provide valuable material for investigation of the question as to the periods during which means of labor function.

Among the basic iron and steel units, blast furnaces and open hearth furnaces and rolling mills within the enterprise that formerly came under the Ministry of the Iron and Steel Industry, there are some that went into operation in the pre-revolutionary period and in the years of reconstruction of the national economy and of the first five-year plan, as may be seen from the following table:

Year Into Operation	Blast Furnaces		Open Hearth Furnaces		Rolling Mills	
	Number	Percentage of total	Number	Percentage of total	Number	Percentage of total
1900	7	6.5	13	4.5	20	8.2
1910-1916	5	4.6	26	9.0	30	12.3
1917-1927	3	2.8	5	1.7	15	6.1
1928-1932	11	10.2	9	3.1	13	5.3
1933-1937	5	4.6	27	9.4	22	9.0
1938-1940	2	1.9	8	2.8	5	2.0
1941-1945	27	25.0	77	26.7	55	22.4
1946-1950	25	23.1	67	23.3	49	20.0
1951-1956	23	21.3	56	19.5	36	14.7
Total as of January 1, 1957	108	100.0	288	100.0	245	100.0

The table also shows that the bulk of the basic equipment of the iron and steel industry (75 out of 108 blast furnaces, 200 out of 288 open hearth furnaces, 140 out of 245 rolling mills) were built or reconstructed and simultaneously modernized after 1941. Moreover, the new units not only predominate numerically but are substantially more productive. The new blast furnaces smelt more than 90% of the pig iron, and three new continuous and semi-continuous sheet mills produce 65% of the thin sheet (while the other 80 mills produce only 35%), two rebuilt and one new mill yield 40% of the large merchant stock (while the other 20% yield 60%).

According to the method developed by the TsNIChermatom, only new units or those started during the second five-year plan but modernized and rebuilt thereafter were subjected to investigation (the large section mill at the Magnitogorsk iron and steel works, the wire mill of the Dzerzhinsky mill, etc.).

The fixed capital of the iron and steel, coke-chemical,

refractories and ore mining branches of industry consists of various elements utilized under conditions of heavy thermal and mechanical loadings, large temperature drops, and intensive chemical reactions. Some elements of the fixed capital require repeated rebuilding due to inadequate service life and resistance of materials of construction or due to exceptionally severe mechanical and thermal conditions of operation. Other elements are so long lived that they lose their use value due to technological obsolescence and the economic inadvisability of their further utilization.

Total and efficient utilization of the use value of a complex of means of labor requires that elements, assemblies and parts subject to excessive wear be replaced once or more frequently. This replacement takes the form of major overhaul, which constitutes partial, detail-by-detail replacement, or, in other words, replacement in kind. The total length of time during which a complex means of labor functions is largely dependent upon the volume of major overhaul, as is testified to by the following data:

Structural element	Service life, years	Value		Need for capital repair (in thousands of rubles)
		In thousands of rubles	As percent of total	
A	20	300	30	—
B	10	200	20	200
C	5	100	10	300
D	4	200	20	800
E	10	200	20	200
Total	—	1,000	100	1,500

The table shows that in order to make complete utilization of the use value of a basic structural element A, the cost of which is 30% of the value invested in the total complex, the life of the latter should be set at 20 years. During this period, elements B and E are replaced once (at the end of the tenth year of operation), element C — 3 times, and element D — 4 times. A million and a half rubles are spent in 20 years on basic overhaul. In this turnover one million rubles' value is invested in the given complex of means of labor, the total expenditures through the amortization fund exceed 2-1/2 million rubles in view of the difference in turnover of the individual components of this fund (due to the difference in service life of these various elements). As the value advanced in elements B, C, D and E turns over from two to five times (during the 20 years that the item under observation functions), the amortization fund also shows a million and a half rubles required to finance capital repair. The financing of basic overhaul requires no value over that invested in the complex of means of labor.

After the identification of the inventory items representing the basic equipment of a unit of an iron and steel mill, an open hearth furnace or a rolling mill, it is necessary, with the assistance of skilled experts on the plant staff, to break down each inventory item into its structural elements, assemblies and parts. After this dissection, it is necessary to determine the major elements whose service lives define the over-all turnover of value invested in the given inventory item. However, it is not always possible to accumulate the necessary data from bookkeeping reports, as structural elements of this type usually considerably outlive the maximum periods for storage of bookkeeping records, and the inventory chart very frequently is incapable of

answering all the questions that have to be posed. Therefore, the expert factory personnel is involved in determining the service life of the fundamental unit. This term of years is established with due consideration for technological progress and class 2 obsolescence, as well as of the economic desirability of carrying out basic overhaul after this period has elapsed.

Reporting for bookkeeping and technical operating purposes offers adequate data on previous basic overhaul. Official reports on defects, preliminary and actual financial reports on basic overhaul, entries into the logbooks of department mechanics with respect to inspections and inventories of equipment, records kept by the bookkeeping department on liquidation of fixed capital, etc., make it possible to determine the length of each cycle of basic repairs and the extent thereof in natural indices, which are then recalculated into current prices.

The TsNIChermat, testing its method at the Hammer and Sickie factory, found that an open hearth furnace entered in the books as a single inventory object was put up for basic overhaul every six years. The cost of this overhaul was 67% of the value of the rebuilt furnace in current prices. The refractory elements of the open hearth furnace, including the bottom and the checker-chambers (50% of the current value of the furnace), and the metal fabrications (21.5% of the value) were one third replaced every six years, while 50% of the equipment and the notch (15.5% of the value) were also given basic overhaul every six years. An analysis of the condition of the structural elements of an open hearth furnace at the Hammer and Sickie plant at the time of the third overhaul, that is after 18 years of operation, shows that, with consideration for technological progress, the

total life of a furnace of this kind can be set at 18 years.

An inventory item of such complexity as a one thousand cubic meter blast furnace can be broken down into six structural aggregates and valued at 10 million rubles (on the

basis of the Giprometz handbook for the forthcoming revaluation of fixed capital). As a result, the following data are obtained:

Combined inventory items	Service life, years	In thousands of rubles	Percent of total	Major repairs required (thousand rubles)
Foundation	25	600	6	
Steel fabrication	25	1,500	15	
Iron and steel castings	12.5	3,000	30	3,000
Lining	5.0	2,500	25	10,000
Water piping, etc.	12.5	400	4	400
Equipment	12.5	2,000	20	2,000
Total	—	10,000	100	15,400

Although the foundation of a blast furnace and its steel structures can last not less than 50 years, according to expert opinion, we have taken a 25-year service life in the light of the fact that utilization of the furnace for longer than that period is inefficient due to the need for considerable outlays on major overhaul. The strongest and structurally most coarse components of a blast furnace (the foundation, steel fabrications, including the shell, the iron and steel castings of the furnace itself, etc.) constitute 21% of the cost of the furnace with its equipment and are capable of functioning for 25 years. The structural elements of shorter life (refractory brickwork, including the hearth bottom, the furnace equipment, the tuyere and slag-tapping equipment, the cinder-notch stoppers, the bosh cooling plate, etc.) constitute 25% of the cost of the furnace and can function for not more than 5 years. Usually, every 4 to 5 years after it has been blown in, a blast furnace is put up for major overhaul for complete replacement of refractory brickwork, including the hearth bottom, and also for partial replacement of details (bosh cooling plate, slag implements, lining plates, cinder-notch stoppers). The remaining structural components (iron and steel castings, the fabrications and equipment of the throat, the fabrications and equipment of the bridge, the electrical equipment and water lines), which serve for 12-1/2 years, are replaced during the second or third major overhaul, and, it may be, at other intermediate times.

Thus, in order to guarantee complete utilization of the use value of the aggregate and total turnover of the value invested, it is necessary to expend 15,400,000 rubles on basic overhaul during the 25 years of operation of a blast furnace. This is 50% more than the initial cost of the furnace.

The Economic Research Institute of the State Planning Committee approved the TsNIChermert method and recommends it, in its own instructions on method, for the iron and steel industry and its supporting industries (ore mining, coke-chemical refractories). In addition, the NIEI of the State Planning Committee advises that the service life of equipment in the petroleum industry be determined on the basis of "weighted averages." The methods instructions of the institute cite an example of calculation of such an "average weighted" term for an installation for thermal cracking, consisting of four major parts of the inventory item. (See following table.)

In the methods instructions, the service life of this inventory item is set at 7-8 years on the basis of an "average

	Average service life (years)	Percentage of cost to total cost of inventory item
Furnaces	8	20
Evaporator	4	15
Hot pump	8	10
Gasoline condenser	7	15

weighting" calculated as follows:

$$\frac{8 \times 20 + 4 \times 15 + 8 \times 10 + 7 \times 15}{20 + 15 + 10 + 15} = 6.75$$

According to the method of the TsNIChermert, the service life of a thermal cracking equipment should be 8 years, in the course of which time the use value of the furnace and the hot pump will be completely used up, and the cost of major overhaul for replacement of the evaporator after four years is 15% of the cost of this inventory item.

At the present time, the work of the institutes under the guidance of TsNIChermert, to determine the service lives of the major specialized items of capital so as to discover the volume of basic overhaul, has been completed. The TsNIChermert possesses all the data on the investigations made at the Magnitogorsk Iron and Steel Works, and the Dzerzhinsky, the Petrovsky, the Azovstal, the Zaporozhstal mills, the ore mines of the Krivoi Rog and the Nikopolmar-ganets, as well as at eight tube mills, 6 refractory mills, and two ferro-alloys plants. These investigations embraced hundreds of inventory objects in the basic iron and steel units, blast and open hearth furnaces, Bessemer converters, electric furnaces, breakdown and rolling mills, re-heat furnaces, traveling electric cranes, roasting furnaces, refractory plants, and tube rolling and welding mills. All these data will be able to be utilized effectively for elaboration of drafts of new standards of amortization deductions for the specialized fixed capital.

As we know, the State Planning Committee of the USSR bears the responsibility for elaborating classifications for calculation of amortization standards and compilation of methodological instructions for determination of new

amortization standards, to assure reconstruction and basic overhaul of fixed capital with due consideration for intensity of exploitation and obsolescence of equipment. The NIEI of the State Planning Committee was assigned to solve the problem of the relationship between this classification and the standard classification of fixed capital, as well as of the items with respect to which amortization deductions should be made and the relation thereof to inventory items as the primary unit of analytical bookkeeping.

The classification of fixed capital for purposes of amortization should be based on the standard classification of the Central Statistical Administration which provides the foundation for analytical bookkeeping with respect to such capital. All subsidiary categories and sub-categories set up for amortization deductions in accordance with the homogeneity of the purposes to which the capital is put in terms of production engineering and comparable service lives should fall within the limits of the standard classification of fixed capital by the Central Statistical Administration. Therefore, the suggestion to eliminate the classification "transfer devices," to establish a category called "automation," to divide the machinery category in half, etc., will inevitably result in making corrections in the standard classification of fixed capital by the Central Statistical Administration. If this is not done, and also if there is not some reorganization of the card files at the plants themselves covering the fixed capital, it will be difficult for the accounting departments at the various industries to make the required deductions for amortization.

In the process of elaboration of the classification of fixed capital for amortization purposes, the NIEI of the State Planning Committee, jointly with scientific research institutions, particularly the TsNIChermert has solved the problem of identifying the object with respect to which amortization deductions are made, as the basic unit in the classification. In many cases, for example with respect to buildings, structures, simple machines, machine tools, and transportation equipment, an item used as an amortization unit may well correspond to an inventory item. However, not infrequently, the former will include a complex of machines, devices, and apparatus carried on the books individually as inventory items. This combination of inventory items related by the unity of the technological process pre-determines the fact that each component thereof will share the fate of the whole, regardless of the length of time that each is capable of existing individually.

In accordance with the methods instructions of the State Planning Committee, the unit from which amortization deductions are made in the iron and steel industry is the entire complex of machinery and equipment of a sintering plant, a blast or open hearth furnace, a coke battery, roughing, finishing, rolling and tube mills, electric furnaces, tube welding and tube casting equipment, with the exception of cranes and transportation equipment.

The standard of amortization deductions, the accounting form taken for returning the value of fixed capital as it is worn out, constitutes a unity of two parts, the purpose of one of which is to return the cost of the fixed capital as its use value is utilized, and the second is to provide a return of this value in the form of major overhaul of various component parts of the complex of means of production. The difference in service life of the various components of a complex aggregate of means of production inevitably has the result that a portion of these elements will be replaced repeatedly in the form of major overhaul, while another portion will continue to exist, thus determining the total life of the entire complex. In connection with the difference in the life of individual elements of the given complex,

differences occur in the turnover of components of the value advanced, of which some portion is turned over several times, providing for the financing of major overhaul, while another portion undergoes only a single turnover.

In the methods instructions of the USSR State Planning Committee, note is taken of the fact that "different rates of amortization" should be maintained for replacement purposes and for major overhaul due to the peculiarities involved in the formation and utilization of these deductions for amortization, and it is repeatedly emphasized that the matter at issue relates to two portions of a single standard.

Under the generally recognized formula, calculation of the rate of amortization is as follows:

$$S_a = \frac{(R + O_m - V_r) \times 100}{T \times R}$$

where S_a is the amortization standard, R is the replacement value of the capital, O_m are expenditures on major overhaul, V_r is the residual value on liquidation, T is the turnover period for the value advanced, or the term during which this capital functions.

V_r (the residual value upon liquidation) can readily be eliminated from this formula as insignificant. The equipment of the major departments of iron and steel mills (blast furnaces, steel melting and rolling) is valued in current prices in the category of 6,000-10,000 rubles per ton, and the amortization scrap into which the equipment is reduced after utilization is carried at 150-200 rubles per ton. Moreover, it must be borne in mind that in order to produce scrap and sell it at the current price, labor has to be expended upon disassembling the equipment, and upon reducing it to a compact mass for utilization in open hearth furnaces.

In connection with the methods instructions of the State Planning Committee with respect to the unit to be employed for amortization deductions, the material obtained by research done by the TsNIChermert and other institutions with respect to inventory objects, and all the indices thereon (regarding service life, cost in current prices, volume of major overhaul) may be grouped without special effort and utilized to determine the service lives of the given objects.

On the basis of these data it is not difficult to establish a standard of amortization, for example, with respect to the complex of machinery and equipment for a one thousand cubic meter blast furnace by assembling all the major inventory items with an estimate of replacement cost, giving due consideration to service life and the required major overhaul. We present on the following page the corresponding data (in round figures).

The aggregate of a blast furnace of one thousand cubic meters capacity, including the buildings, structures, ore yard, ore bridge, power producing and working machinery, etc., is valued at current prices at about 45 million rubles, while that portion of the whole that we present in the table shown on the following page is valued at 26 million rubles. The service life of this aggregate has been set at 26 years, as three of the six groups of inventory objects (the blast furnace proper, the Cowper stoves, and the charge bridge), valued at 21 million rubles, will function 25 years under the condition that major overhaul to a value of 25,400,000 rubles will be carried out during this period on these items alone, of which 15,400,000 will be spent on the blast furnace itself. The three remaining groups of inventory items in the blast furnace aggregate (the gas cleaner and its piping, the bunker equipment, and other equipment), to a

	Service life (years)	Value		Basic overhaul required during service life (in million rubles)	
		In millions of rubles	As percent of total	Of the inventory item	Of the aggregate
The blast furnace proper	25.0	10	38.6	15.4	15.4
The Cowper stoves	25.0	10	38.6	8	8
The gas chambers and their piping	12.5	2	7.6	2	6
Bunker equipment	12.5	1	3.8	1	3
The charge bridge	25.0	1	3.8	2	2
Other equipment	12.5	2	7.6	2	6
Total	—	26	100.0	30.4	40.4

total value of 5 million rubles, are capable of functioning for only 12-1/2 years. In order to assure functioning of the entire complex of a blast furnace for 25 years, these three groups have to be replaced within 12-1/2 years, and approximately 5 million rubles has to be spent on major overhaul. Moreover, all three groups of inventory objects (each of which consists of assemblies and parts with service lives of not over 12-1/2 years) cannot function for 12-1/2 years unless major overhaul to a value of 5 million rubles is carried out. Five million rubles has to be spent on major overhaul of these three groups of inventory items (the gas cleaners and their piping, the bunker equipment and other equipment) during the first 12-1/2 years, and in addition, during the thirteenth year, there has to be a single outlay of another 5 million rubles classified as major overhaul for complete rebuilding of virtually all the inventory objects, in addition to which another 5 million rubles has to be spent on major overhaul during the next 12-1/2 years. Thus, a total of 15 million rubles has to be spent on major overhaul of these three groups.

If we apply the formula for determination of amortization standards cited above to this entire aggregate, we obtain:

$$S_a = \frac{(26,000 + 40,400) \times 100}{25 \times 26,000} = 10.2\%$$

in which the portion expended upon replacement is 4%, and the portion to be spent in financing major overhaul is 6.2%.

Preliminary calculations for the open hearth furnace, the roughing, finishing, and shape rolling mills, sintering plant, the coke battery, the Bessemer convertor, and other complexes of machines and equipment in aggregates used in the iron and steel industry may be calculated in the same way.

Judging by preliminary rough calculations in the draft that has been elaborated, the new standards for amortization deductions with respect to the specialized forms of fixed capital in the iron and steel industry, coke chemicals, iron ore, and refractories industries may be increased somewhat relative to the differentiated standards established by the Council of the National Economy in 1930. In that period, the amortization rate for the equipment of iron and steel departments was set at 8.9% per year (assuming three-shift operation), but until January 1938, no provision was made to specifically assign a portion of these deductions for the financing of basic overhaul. According to very rough preliminary calculations, the new standards of deduction for amortization may fluctuate in the range of from 10.2% for blast furnaces to 7.5-8% for breakdown mills, and

the ratios between the portions assigned to replacement and to basic overhaul will also vary.

A government order of January 1938 established an average amortization standard for the entire People's Commissariat of Heavy Industry of 5.6% (including 2.4% for major overhaul). The Commissariats and the Bureaus were instructed to work out differentiated rates of amortization and differentiated scales of allocations for major overhaul. However, the differentiated rates of amortization were not developed. The classifications and standards established in 1930 continue to be operative in industrial enterprises, and in particular in the enterprises of the iron and steel industry. This compels the bookkeepers of the individual enterprises to enter corrections in the sums originally calculated for amortization so as to include in the amortization standard the amortization fund established by the industrial financial plan for the given year.

In 1957, plants and integrated mills in the iron and steel industry calculated amortization on productive capital at 5.4% (of which 3.1% was for new investments and 2.3% for basic overhaul). Had amortization been calculated on the basis of the differentiated standards established in 1930, and on the basis of the structure of the fixed producing capital as of the status of January 1, 1958, it would have been 5.85%, or in other words 8.5% higher than the rate at which the calculations were actually being made. In the cost of production for the market in these enterprises of the iron and steel industry, the amortization rate in 1957 was 5.6%.

The new standards for amortization deductions in the various specialized types of fixed capital employed in the iron and steel industry and its supporting branches of industry should reflect the actual rate of wear of this fixed capital. The difficulty is in reflecting the actual wear found by research in the new standards so as to avoid excessive increase in the standards above the cost actually transferred.

As has previously been noted, the new standards of amortization deductions with respect to the specialized fixed capital in iron and steel could be increased somewhat. However, this increase is explained not at all by the fact that the new standards include not only the transferred cost of the fixed capital, but a portion of the national income as well, but by the fact that the standards of 1930 and the current practice in amortization deductions underestimated the actual rate of wear. The annual reports of the metallurgical plants and integrated mills show that many millions have been written off as losses in the liquidation of fixed capital because the fixed capital going out of use had not been completely amortized. This was explained not only

by the fact that the practices employed in amortization deductions did not consider technological progress and obsolescence of class 2, but also by the fact that the existing standards of amortization did not always reflect the real rate of wear.

At this point it is difficult to foresee how the new standards of amortization deductions for specialized fixed capital items in the iron and steel industry will reflect upon the cost of production, inasmuch as, in the first place, it is difficult to guess in advance the results of the revaluation of this fixed capital that is to be performed and, secondly, we do not possess data for judgment as to the level at which the standards of amortization deductions for non-specialized fixed capital items will be set. Apparently, there will be an increase in the valuation of the fixed capital of the iron and steel industries of the Urals, which constitutes 36.6%, and of Siberia, which constitutes 8% of the total book value of the fixed capital of mills and factories in this field. This will apply particularly to the plants launched during the first and second five-year plans. The value of the fixed capital of the iron and steel industry in the south (specifically those restored and equipped during the first post-war five-year

plan, when cost of equipment was higher), and which total 48.5% of the total, will be revaluated downward to some degree. Therefore, the total deductions for amortization at the metallurgical enterprises of the Urals and Siberia will be increased, while at the iron and steel enterprises of the south it will show something of a decrease.

The specialized fixed capital items with respect to which the TsNIChermet is elaborating standards of amortization deductions constitute not more than 55-60% of the total fixed capital of the metallurgical industry. The rest of the fixed capital includes all kinds of general civil engineering buildings and structures, machine shops and foundries, power supplies, railway trackage and roads. If the standards of amortization deductions for the specialized fixed capital are somewhat increased, the standards for the non-specialized fixed capital of the iron and steel industry will not undergo any significant change, for the most part.

The elaboration of new, scientifically valid and economically justified standards for amortization deductions is a matter of major governmental importance.

CRITICISM AND BIBLIOGRAPHY

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Problems of Distribution of the Food Industry of the USSR

Distribution of the Food Industry of the USSR, by L. V. Opatsky, Gosplanizdat, 1958, 354 pp.

One of the most important steps being carried out in the USSR for the purpose of bringing about a considerable rise in the living standard of the working people is the further development of all branches of the food industry capable of effecting mass production of quality foodstuffs with minimum labor.

This has been facilitated to a considerable degree by the increase in production of farm produce during the past five years (1953-1958) constituting the results of the realization in life of the decisions of the party and government directed toward overcoming the lag in agricultural production.

According to the target figures for the development of the national economy of the USSR in 1959-1965 adopted at the 21st Congress of the Communist Party of the Soviet Union, it is proposed to increase the gross production of the food industry by about 70% during the seven-year plan. This requires expansion of production capacity both by expansion and reconstruction of existing enterprises and by means of a considerable amount of new construction. During the seven-year plan, it is projected that 35 billion rubles will be invested in the food industry, not counting the fisheries. This is 252% of the scope of capital investment therein during the preceding seven years. During the same period, about 250 new meat packing plants, more than one thousand dairies, more than 200 canneries, 83 sugar refineries, 200 bakeries, etc., are to be built.

Rational geographic distribution of new factories and mills as well as expansion and reconstruction of the existing enterprises can be carried out only if planning practices make all-sided provision for the requirements of the objective economic laws of socialism, the specific conditions of a given branch of the economy, and the problems facing it at the given stage of the upbuilding of communism. From this we see how important it is to study the specific features of the development and distribution of various branches of industry as they relate to related branches of industry and agriculture, as well as a scientific analysis of the factors by which a maximum economy of outlay of social labor is obtainable.

A monograph prepared in the Economics Institute of the USSR Academy of Sciences by L. V. Opatsky on the distribution of the food industry, which comprises more than twenty different branches, is devoted to these problems.

The author of the book under review made it his object to analyze the general characteristics of the development of the food industry, to investigate the foundations and peculiarities of its distribution with regard to methods of determining these matters, of evaluating existing shortcomings and disproportions so as to assist in improving the solution of problems of location of the food industry in the future.

Proceeding from the general principles of distribution of socialist industry, the author indicates specific problems of

the development and distribution of this branch of industry, its place and significance in the national economy, the advantages of the current distribution of the Soviet food industry over the pre-revolutionary distribution, and offers a critical analysis of the existing practices in the distribution of new enterprises and proposals to improve these practices. In addition, L. Opatsky notes that many branches of the food industry are typified by a great deal of diversity. Therefore, the specific elaboration of problems of location of specific branches requires special investigation. This book not only examines the complex of questions pertaining to distribution of the food industry, but provides a fairly detailed illumination of the economics of this branch as a whole. And this of course will increase readers' interest in the work.

Part I of the book under review analyzes the development and distribution (geographic) of the food industry in pre-revolutionary Russia, the influence of residues of feudalism and the peculiarities of the development of capitalist relationships of production upon the development of the food industry.

It should be noted that Opatsky's book provides a more complete analysis than do earlier books in this field of the historical aspects of the totality of questions behind the development and distribution of the food industry in pre-revolutionary Russia. However, the author's assertion that "hitherto there has not been a single piece of research" (page 6) into problems of development and geographic distribution of the pre-revolution food industry is not quite accurate. Previous studies of the food industry did shed light on the basic tendencies of the development of this industry in old Russia. Moreover, dissertations in the fields of the sugar, canning, brewing and other branches have provided detailed analysis of the state of the pre-revolutionary economy in these branches against the background of the general geographic distribution of the forces of production.

In this same part of his book, the author examines questions of concentration of the pre-revolutionary food industry. He shows that as early as the 19th century, large industrial enterprises equipped with machinery that was advanced for its day forced out all previous forms of industrial production in the sugar and alcohol industries. The process of concentration also proceeded in other branches of the food industry, and specifically in the tobacco, the oil pressing and the flour milling industry. About one-half of the total output could be ascribed to large enterprises. True, there were some branches in which the number of small handicraft type enterprises increased alongside of heavy concentration of production.

The major attention in L. V. Opatsky's book is given to the investigation of the question of the concentration of production in the most important branches of the food industry. The fact is that this process proceeded quite intensively in certain smaller branches as well. Thus, for example, machinery was used in the macaroni industry in pre-revolutionary Russia (screw presses, steam machines and chamber dryers). In 1856 there was a macaroni factory in Moscow having a steam machine, four hydraulic presses and chamber dryers. This factory processed 12,500 poods of macaroni products per year. In 1913 there were already 39 macaroni factories in Russia, with a total of 200 presses and 1,554 workers. In the brewery field, beer output

multiplied more than 13-fold from 1860 to 1913. This increase was accompanied by a continuous reduction in the number and increase in the capacities of the breweries. In 1913, 58.5% of all the beer produced in the country was brewed in large enterprises.

On the basis of an analysis of the distribution of the sugar, alcohol, oil pressing and other branches the author demonstrates that the Soviet Union inherited an exceedingly unbalanced geographic distribution of food enterprises. Factory-scale treatment of food products was concentrated mainly in a very few districts. Thus, Moscow and St. Petersburg provinces processed about 75% of all confectioneries and about 50% of all cigarettes. More than 80% of all the sugar was produced in the Ukraine, where a considerable portion of the wineries were also located. More than 70% of the enterprises in the oil pressing industry were concentrated in the central districts, although Central Asia and the Ukraine were the major sources of raw materials.

The principles of distribution of socialist industry and the peculiarities of distribution of the food industry constitute the subject matter of the second part of the book under review. It illuminates the role of the food industry in socialist reproduction, as well as the history of the development in the USSR of a large-scale food industry, in conjunction with the fundamental socialist changes in the economy resulting from the industrialization of the country, the socialist transformation of agriculture and the continuous improvement in the living standard of the working people.

The author provides a detailed examination of the need for consideration, in planning geographic distribution of food enterprises, of economies in concrete and abstract labor, in increasing the productivity of labor at all levels of production, and the influence of various factors in the foregoing: raw materials, transportation of raw materials and fuel, transportation of finished products to the site of consumption, as well as the influence of technological progress. On the basis of analysis of these factors, L. Opatsky comes to the conclusion that a tendency toward physical approximation of production and consumption is typical of the food industry. This tendency is most marked in the distribution of the flour, baking, dairy, foodstuffs, confectionery and other branches which produce a large quantity of perishable products or products that withstand transportation poorly. This same tendency is observed to some degree in the distribution of branches processing non-transportable agricultural raw materials, but only to the degree that conditions of soil and climate, as well as economic factors make possible the development of new sources of raw materials for these industries in areas closer to those in which they are consumed. In those branches of the food industry, the geography of whose raw material supplies does not correspond to the geography of consumption, this tendency is expressed in a trend to specialized enterprises by stages of the production process and to distribute them accordingly. Plants engaged directly in processing the original agricultural raw material are placed where it is produced (granulated sugar refineries, tobacco fermentation, wineries, tea leaf processing, etc.), while plants engaged in completing the production process and in putting out the finished product (refined sugar, secondary-stage wine-making, tobacco and tea factories, etc.) are set up in the districts where the products are consumed.

The author notes that the tendency toward geographic approximation between production and population distribution is manifested to differing degrees in different branches of the food industry. However, it would have been necessary to emphasize that, in solving problems of distribution, one cannot take a single factor as determinate, but it is

necessary to take into consideration the entire totality of factors governing proper distribution of enterprises of this industry which has so many branches and is so varied in technology and equipment.

The organizing role of the food industry in the development of its sources of raw materials is quite familiar. The food industry presents specific specifications with respect to the properties and quality of the raw materials it utilizes. The processes of treatment and the taste qualities of the finished product depend to a considerable degree upon periods of maturation, grading, capacity for long storage and other properties of the raw materials. The sugar content of beet root, the oil content of oil seed, the amount of dry matter in tomatoes, etc. influence the yield of product per unit of raw material, and the expenditures upon processing and other industries. This makes clear how important is the role played by soil and climatic factors in determining the properties of the raw materials, the length of the growing season, and other factors affecting yield, cost of raw material production and, consequently, the cost of the industrial product. This makes it necessary, in planning the location of enterprises in the food industry, to take into consideration both the special features of the individual crops and of branches of agriculture.

The book uses a number of examples to illustrate the advantages of the organization of specialized raw material zones for the various branches, which are of great importance for production in the sense of reducing the radius within which the raw material is shipped, controlling the intervals at which deliveries are taken, preserving the quality of the raw material, reducing expenditures upon preparation and transportation, etc. At the same time, specialization of the raw material zones corresponds to the interests of agriculture, and facilitates mechanization of the work of cultivating given crops in areas near factories, makes for an increase in monetary income from the particular crop and aids in the utilization of factory discards for livestock feed, etc.

Under the new conditions of planning of agricultural production and of industrial administration, the possibilities of establishing an even closer relationship between the food-stuff enterprises and the collective and state farms of the given zone are facilitated.

Moreover, it should be noted that a more profound analysis of the shortcomings of the existing practice in organization of raw materials zones (in the sugar, alcohol, and cannery industries) expressed in part in the fact that enterprises of some branches of industry have taken themselves out of active participation in cultivation and organized purchase of industrial crops (for example, breweries and barley production), would have enabled the author to give a sharper edge to the attention he does give to questions of improving the organization of the raw material supply of the food industry that are now coming to a head.

In addition to correct geographic distribution of enterprises, an important role in the development of the food industry is played by determination of rational capacities for various enterprises. In this connection, the author is correct in noting that differences in the concentration of the source area and in the density of population affect the concentration of production. Therefore, three or four different standard types of enterprises of different capacities should be worked out for each branch of the food industry.

The book also gives attention to problems of specialization, subcontracting, and coordination, which have had considerable development in the food industry but have hitherto had inadequate expression in the literature. In a number of branches of the food industry that process raw material,

specialization in terms of the stages of the production process is highly developed, division of plants into enterprises for the refining and the granulation of sugar, into alcohol and liquor enterprises, into tea processing and tea package plants, in the fermentation and tobacco industries, into primary and secondary wineries, etc. This kind of specialization provides a considerable economy in transporting the primary processed material. There are also important perspectives in the field of combining such enterprises as flour mills and bakeries, oil pressing enterprises and hydrogenation plants, etc. All this is intimately related to the solution of problems of geographic location of enterprises. In investigating the role of the transport factor in the distribution of the foodstuffs industry as one of the most important conditions for saving social labor, L. Opatsky demonstrates the influence of the inadequate utilization of the carrying capacity of freight cars upon increase in storage costs. For example, only 6.5 tons of tobacco products and 12 tons of macaroni can be placed in a 20-ton capacity freight car, and only 2.5 tons of cattle can be carried in the same kind of closed car. The cost of haulage due to packing materials is also sharply increased. Thus, when beer is carried by the case (20 bottles) the beer represents 10 kilograms and the bottles and case 13.5 kilograms of the total weight. As the result, the costs of transportation for raw materials and finished products are 60% greater in, for example, the packing house industry, than the cost of processing the raw materials. This makes clear how important it is, in the light of the ever increasing volume of haulage of raw material and finished food industry products, to transfer this haulage to the most advanced economical form of transportation which would serve both to speed haulage and to cut its cost. For certain types of food products it is necessary to convert to bulk haulage (for example in the case of flour) while in others it would be desirable to shift from railway to truck transport.

In his third section, which comprises nearly half of the book under review, the author presents data on the significant shifts that have taken place in the distribution of the food industry during the years of the upbuilding of socialism.

Whereas during the first years of the fifth five-year plan, it was necessary to haul up to 100,000 tons of cotton seed from Central Asia to the Volga and other districts for the oil fats industry, today the accelerated construction of oil processing plants in Central Asia has completely freed our economy from long hauls of cotton seed because they are all processed on the spot.

In connection with the development of more than twenty sugar mills in various parts of the country, the share of the Ukraine in the production of granulated sugar has diminished from 81.5% in pre-revolutionary times to 70.9% in 1955. At the same time, the share of the RSFSR in sugar production is increasing. It will rise particularly sharply upon completion of the construction of a new center of the sugar industry in Krasnodar territory and other districts in Russia.

It should however be observed that long hauls of a number of food products still occur. Thus, in many districts of the country, we find the products of the large confectionery enterprises of the center. The confectionery enterprises of Moscow, Leningrad and the Ukraine ship more than 200,000 tons of products annually, chiefly eastward. The average length of these hauls is more than 2500 km, and the costs thereof are more than one hundred million rubles. Irrational hauls of tobacco, liquors, vodka, salt and certain other products also occur.

In recent years, the problem of accelerating the

construction of food enterprises in the eastern portions of the country, where production of confectionery products, cannery products and certain other foodstuffs is considerably less than the USSR average, has become particularly acute. While urban population of the eastern districts has increased fivefold from 1926 to 1956 and constitutes 31.4% of the total urban population of the USSR, the share of the eastern districts of production of the most important foodstuffs was as follows in 1955: 6% of the granulated sugar, 1.6% of the lump sugar, 15.6% of the margarine, 11.6% of the cigarettes, etc. This results in economically unprofitable hauls of food products.

L. Opatsky shows that the basic reasons for the definite lag in the development of the food industry in the east consisted not only of the limited investments of capital but in the difficulty in establishing new supplies of raw materials and in the absence, in a number of cases, of serious economic justifications for new capital investment. Proposals advanced in the book with respect to the need for pushing the construction of foodstuffs enterprises to the eastern districts should be reinforced by more detailed analysis of the raw materials possibilities of these districts, of the labor resources available, and of other necessary factors. The author analyzes questions of distribution of the sugar, cannery, oil pressing, meat packing, dairy and flour industries, and shows the degree to which disproportions have been permitted to develop between the increase in capacity and the available supply of raw materials. He provides a basis for methods of improving the distribution of these branches.

It is emphasized repeatedly in this work that after the decisions of the meeting of the Central Committee of the Communist Party of the Soviet Union in September 1953, there was a sharp increase in the resources of raw materials available to agriculture. This was a factor in accelerating the rates of progress of various branches of the foodstuffs industry. However, in demonstrating the growth of production of food products and the increase in the level of marketable production in agriculture, the author usually compares 1956 (and sometimes 1957) with 1940. In our opinion, it would be much more convincing to compare present day data with the data for 1953. This would make it possible to provide a more rounded indication of the progress made in the foodstuffs industry as a result of the measures taken by the party and the government directed toward a sharp increase in the socialist agriculture.

These shortcomings do not diminish the significance of the book under review. It can serve as a useful aid in planning the development and geographic location of the foodstuffs industry and the branches thereof.

V. Belkin, I. Birman:

A Book by American Economists on the "Input-Output Method"

An Investigation of the Structure of the American Economy, by Wasily Leontief and others. Translation from the English. Gosstatizdat, 1958, 640 pp.

In our country, ever greater significance attaches to investigations having to do with the application of mathematical methods in economic analysis planning, and, in particular, of contemporary computer equipment. It was noted at the 21st Congress of the Communist Party of the

Soviet Union that large scale introduction of machine mathematics into the work of planning and designing organizations would provide a colossal economy and that lagging in this field is impermissible. Economic investigations without the use of mathematical methods should be based on a profound qualitative analysis of the processes and phenomena being studied. A major role in these investigations is played by the method of balance accounts, the solution of extremum problems, etc., developed in the Soviet Union.

During the past ten years mathematical methods have acquired wide currency in the field of economics in the capitalist countries. For purposes of apologetics, the bourgeois economists substitute mathematical constructions for social and economic analyses of the processes occurring in capitalist society. They employ econometrics to attempt to substantiate the fundamental propositions of contemporary bourgeois political economy, the ideological bankruptcy of which becomes ever more evident. However, some works in econometrics are of interest to some degree in terms of applied economics as far as the mathematical methods utilized therein for purposes of economic calculations are concerned.

One of the major trends in modern econometrics is the "input-output" method. Some problems of this method have been elaborated in recent years in certain scientific institutions of the USSR and the European lands of people's democracy with respect to questions in the field of investigation of the socialist economy and the planning of the national economy. In 1956-1958, *Problems of Economics*, *The Bulletin of Statistics*, and certain other journals have carried articles in which the fundamental ideas of the "input-output" method are set forth, a critical evaluation of this method is presented, and methods of utilizing certain of its constructions in the socialist economy are examined.

Recently the Gosstatizdat published a Russian translation of the volume: *An Investigation of the Structure of the American Economy*, written by W. Leontief, professor at Harvard University, and certain other American economists. This work is devoted to problems of the "input-output" method. The book consists of five parts. The first part presents the static and dynamic theories of their method, and the second sets forth questions of analysis of regional ties in accordance with the "input-output" scheme. The final three portions of the book examine problems of calculation of the indices needed to conduct investigations in accordance with this scheme (methods of determining coefficients of capital investment per unit output, calculation of coefficients of current expenditures on the basis of engineering analyses, determination of dimensions and structure of ultimate demand).

The theory of statistics revealing the specific features of the "input-output" method is set forth in the book under review most briefly, and presents substantial difficulties for the reader who is not familiar with work in this field. The point is that the work under review is, to a certain extent, sequel to, and the second portion of W. Leontief's book: *The Structure of the American Economy*, which appeared in a second edition in the United States in 1951, and is devoted chiefly to problems of the theory of statistics. It could have been desirable, obviously, to illuminate at least the fundamental propositions of this statistical theory in the preface to the Russian edition so as to facilitate an understanding thereof. Unfortunately, this was not done by Gosstatizdat.

We know that the starting point for the erection of the statistical, and for that matter, of the dynamic theory is an expanded table in chessboard arrangement. The Soviet economist familiar with the balance of the USSR economy

cannot but see a certain similarity between the table representing the balance of the social product and the "input-output" scheme advanced in the book under review. The fact is that the balance method does provide the basis for this scheme. It was first developed and largely applied by Soviet economists as far back as the 1920's as the major method of planning and statistics in the national economy. These balance constructions have served as the point of departure for the development of the "input-output" scheme.

As has been pointed out by V. S. Nemchinov (1), the initial "input-output" diagram was derived by W. Leontief by combining two tables for the balance of the USSR national economy developed by Soviet statistics in the 1920's. One of these tables, the vertical and horizontal column balance for the social product, was expanded by him and rendered more detailed, while the other — the national income balance — was sharply contracted. The result was the production of a balance table divided into four unequal quadrants. The horizontal lines in this table are used to show the distribution of the annual production in various branches for purposes of production (first quadrant) and for satisfaction of ultimate demand-unproductive consumption and export (second quadrant). The statistical diagrams under discussion also classify accumulation in the field of ultimate demand. The columns of the table illustrate the expenditures on production named in accordance with the subject and expended upon the product named in the predicate (first quadrant), as well as the outlay of labor and the surplus value created in the production of this product (third quadrant). The fourth quadrant illustrates relationships of redistribution.

The first quadrant, which is actually a balance for the social product, occupies the dominant position in "input-output" tables. It describes the technical and economic ties among the branches of the national economy. The second, third and fourth quadrants are a "prepared" balance of the national economy and express the social and economic ties among production, consumption and accumulation, the movement of incomes, etc.

While the technical and economic ties among branches of industry with respect to the production of the social product attain fairly detailed expression in this diagram, the social and economic ties are illuminated in very compressed and distorted forms. The combination of wages and surplus value, incomes from labor and incomes from exploitation in the second and third quadrants, the fact that relationships of redistribution are ignored (fourth quadrant), destroy the usefulness of this portion of the diagram to a considerable degree. It is hardly necessary to demonstrate that this type of construction of the diagram with respect to social and economic ties is explained by the bourgeois apologetic position of its author.

Thus, as far as we are concerned, only the first quadrant of this diagram, which characterizes technical and economic relationships, can be of interest to us in terms of methodology. The mathematical transformations and the classifications of this quadrant, and the derivation of the initial data to fill it out are given particular attention in the book under review.

The mathematical methods used in "input-output" investigations permit the discovery and quantitative determination not only of direct but of the so-called indirect ties among branches of industry in the production of the social product.

The transformation of the column-and-line balance (first quadrant) in statistical theory reduces itself to the fact that the indices arranged along the columns of the column-and-line balance are divisible into the totals of the

columns (and if they are given in units of kind, then they are divisible into the totals of the lines of similar identification). The result is to provide the outlay per unit production. The column-and-line balance is thus converted into a table of direct expenditures or into a so-called matrix of technical coefficients a_{ik} , which reflects the expenditure of product i on production of a unit of product k .

The statistical theory bases itself on the starting point that economics is capable of description with the aid of the a_{ik} coefficients by means of equations of the type:

$$X_i - \sum_{k=1}^m a_{ik}x_k = Y_i \quad i = 1, 2, \dots, k \dots m.$$

The economic meaning of such equations lies in the following: X_i characterizes the level of production of any product i , consumed in the production of all products k from 1 to m and going to satisfy the ultimate demand Y_i .

Solving the resulting system of m equations with m unknowns X_i , we can use ultimate demand to express:

$$X_i = \sum_{k=1}^m A_{ik}Y_k \quad i = 1, 2, \dots, m.$$

Taking $Y_k = 1$, the coefficients for total expenditures A_{ik} may be regarded as levels of production of the products i going to satisfy ultimate demand for a unit of product k .

It must be stated that, not only in terms of the column-and-line balance, which serves as the starting point for the "input-output" constructions, but in terms of the mathematical transformations of this balance, the theory of W. Leontief is not as original as many foreign economists deem it to be. Specifically, we have in mind the fact that the use of a system of linear equations to calculate coefficients of total expenditures was suggested as far back as L. Walras (1883) and subsequently by V. Dmitriyev (1904). The fact that it has proved possible to apply these equations to concrete economic analysis only in fairly recent times is to be explained not only by difficulties of a methodological character but by the absence in the past of sufficient statistical information and the appropriate equipment: computers for solution of large numbers of equations.

In the USSR, investigations into the utilization of certain of the constructions of the "input-output" method in the planning of the national economy, along with certain other economic investigations requiring the performance of a large number of complex calculations, were begun with the development of electronic computers and first got under way in the Institute of Electronic Control Machines of the USSR Academy of Sciences (1956). The training of economists skilled in mathematical methods, and specifically in the "input-output" method was organized at the Moscow State Economics Institute under the specialty "planning of the national economy with the aid of electronic machines." The significance of electronic machines for practical calculations along the lines of "input-output" procedures becomes obvious if one bears in mind that the calculation of tables of coefficients of total expenditures to the scale of, for example, 100×100 (100 branches-products in the subject and 100 in the predicate) requires about 15 million, and a table of 1000×1000 requires several billions of interrelated operations of calculation.

The significance of the coefficients of total expenditure for economic calculations is evident from the very definition of these indices. Inasmuch as the coefficients of total expenditures characterize the level of production of various products of the national economy necessary to produce a unit of a given product for purposes of consumption and accumulation, one may, if one provides in planned projections various scales of consumption and accumulation, employ these coefficients to calculate the corresponding volumes of production in all the branches of the national economy.

In the socialist economy, the coefficients for total input

may be utilized in planning the national economy. The coefficients of total input may be employed in electronic computers to work out diverse variants of a plan and to compare them with the object of producing an optimum plan. (2)

Under capitalism, with its competition and anarchy of production, economic analysis performed on the basis of these coefficients is concerned chiefly with the past. The utilization of total input coefficients to measure the relationship between levels of production and ultimate demand loses significance, as under capitalism the scale of ultimate demand is something that can be no more than guessed, even for the comparatively near future. This becomes particularly evident as soon as W. Leontief proceeds from the statistical theory of the "input-output" method to a concrete investigation. He employs this method to analyze the structure of the American economy and its inter-departmental ties in 1919, 1929, and 1939. The tables put forth in the book show, for example, how closely related the automotive industry is to the other branches of industry in the country, the relationships that exist between the production of coal and the textile industry. However, Leontief is not capable of using his constructions to explain why, for example, automobile production increased 150% from 1919 to 1929, whereas in the following decade it not only failed to increase but even diminished by \$100,000,000 or why, the production of coal and textile products increased from 1919 to 1929 and decreased from 1929 to 1939.

Some foreign writers have attempted and continue to attempt to present econometrics, and in particular the investigations of Leontief, as a method of actively influencing the capitalist economy and as an economic panacea of sorts. Thus, they declare that the utilization of econometrics could allegedly facilitate development of the capitalist economy without crises. The best proof of the absurdity of such assertions are the crises of overproduction in the United States in, for example, 1949, 1954, and from the end of 1957 through the beginning of 1958.

Econometrics in general and the "input-output" method in particular can serve only as a means of very limited quantitative analysis of economic processes and phenomena. Qualitative analysis to reveal the social and economic essence of the processes and phenomena under investigation cannot be performed with the aid of this method. Therefore, one cannot start from the "input-output" diagram and either explain or prevent any sharp drop in rates of output, depressions and economic crises. These phenomena and processes are explicable only on the foundation of Marxist-Leninist economic theory, and they can be eliminated only by eliminating private capitalist ownership of the means of production and replacing it by social ownership.

In their investigation of the structure of the American economy, the authors of this volume, while they do not explain the causes of the cyclic development of the capitalist economy, are nonetheless compelled to deal with it. In so doing they recognize that the uneven character of the development of the capitalist economy influences not only the ultimate demand and volumes of production but the determining indices of the very "input-output" diagram, its technical coefficients. Thus, in comparing the changes in these coefficients in 1919-1929 and 1929-1939, W. Leontief declares: "... the rate of technological progress expressed in these and equally in other indices was lower in the period of the great depression than in the preceding years of big boom" (page 42) (retranslated from the Russian — translator's note).

The uses of the "input-output" theory of statistics are limited not only by the conditions of the capitalist economy.

under any conditions, the constructions of this theory have limited character and assume some degree of abstraction from economic reality. This statistical theory examines an economy in which the standards of material input product i per unit of product k (the technical coefficients a_{ik}) are independent of the scale of production of product k . The a_{ik} coefficients are used as independent variables governing the economy, whereas capital expenditures are transferred outside the bounds of production into the field of ultimate demand, which is inherent in the very essence of this theory of statistics. In this theory, economics is regarded as static at each individual instant in time. Therefore, statistical schemes of this type cannot define the reciprocal influence of capital investments upon the economy, which are expressed both in increasing volume of production and in the changes in its structure and in the technological coefficients. Statistical diagrams for a number of successive moments in economic analysis and planning may be used, if allowance is made for technological progress, the planned introduction into operation of new production capacities, and the influence of other factors, to change these coefficients and obtain the required data. However, correctives of this kind cannot be carried out within the bounds of statistical theory by calculation within a single system of equations, but must be carried out either with the aid of additional calculations for purposes of orientation or even simply "by reasoning."

Mathematical description of economics changing with time is beyond the scope of a static scheme and is the subject of dynamic constructions. Inasmuch as changes in a country's economy with time is, when expanded reproduction occurs, chiefly a function of capital investments, the dynamic constructions employ not only the a_{ik} coefficients and coefficients of capital input B_{ik} , reflecting input of product i in the creation of capacities per unit of product k produced.

The object of dynamic constructions should be solution of the following problem: starting from the presence of productive capacities and the values of the coefficients a_{ik} and B_{ik} at the beginning of the period, as well as of a given ultimate demand for products to be consumed other than for productive purposes, to determine, by precise mathematical analysis, the volume and structure of production and the values of the given coefficients as time functions. Solution of this problem involves determination of the rates of technological progress, the rates of growth of labor productivity, analyses of the a_{ik} coefficients with respect to the fields of production first coming into being, and calculation of the B_{ik} coefficients. W. Leontief proved unable to solve this complex problem. He only indicated the direction for the solution of certain of its aspects, pretentiously designating his constructions "a dynamic theory."

W. Leontief's dynamic constructions consist of the following. In the equation for the static theory adduced above, fixed capital is taken out of the field of ultimate demand, or in other words out of the right side of the equations and is expressed by means of the B_{ik} coefficients, and transferred to the left side. As distinct from the static scheme, in which economics is described by a system of algebraic equations, it becomes necessary in the dynamic constructions to employ differential equations of the following aspect:

$$X_i - \sum_{k=1}^m a_{ik} X_k - \sum_{k=1}^m B_{ik} X_k = Y_i \quad i = 1, 2, \dots, m \\ k = 1, 2, \dots, m$$

This, if one denotes the ultimate demand for objects to be consumed other than in the field of production by Y_i by means of these equations, one may determine the necessary

level of production of the product X_i at any given moment and in the course of any desired period. The result of the solution of this system of equations may be presented in the form of a continuous curve constituting a time function.

The theoretical shortcoming in these equations lies in the fact that it ignores changes with time in the a_{ik} and B_{ik} coefficients. In other words, these equations do not provide for the influence of technological progress. As has been noted in the foreign literature, these equations also fail to reflect the interrelation of changes in the a_{ik} and B_{ik} coefficients.

This is the mathematical and technological-economic side of the problem. However, the social-and-economic side suffers from incomparably greater faults. "In order to predict," writes W. Leontief, "the development of a dynamic system over a given period of time, knowledge of its general law of change is not enough; it is also necessary to be in possession of special information with regard to its state at the initial moment" (page 75). Making casual mention of the "general law of change of the economic system," Leontief conceals the most important thing, to wit, that it is impossible to reveal the economic laws of development of society from the standpoints of bourgeois political economy. The limitations of W. Leontief's constructions, and their erroneousess in terms of qualitative analysis become particularly clear in the presentation of the dynamic theory. Without a knowledge of the laws of development of the economy, it is impossible to solve the problem posed by the dynamic theory — that of giving mathematical expression to the development of the economy.

Proceeding from the cyclic nature of the development of the capitalist economy, W. Leontief is compelled to emphasize the need for short time intervals if his equations are to be employed (page 76). The fact is that mathematical forms of expression of economic changes during the period of upturn and the period of crisis have little in common. The transition from upturn to crisis, and vice versa, require new mathematical constructions characterizing the economic system at the points of inflexion, as well as additional empirical data without which, as the author himself recognizes, theoretical analysis becomes highly speculative. As far as further investigations into the regions of dynamic theory may be concerned, even their direction is as yet undefined, in Leontief's own words (page 94).

The presentation in the second portion of the book of questions having to do with application of the "input-output" scheme for analysis of inter-regional ties is of definite interest. The starting point of the theory of inter-regional ties by the "input-output" method, as dealt with by W. Leontief, lies in the following:

(1) The entire territory of a country is divided into regions which may in turn be subdivided into sub-regions.

(2) All forms of products and services are classified with respect to the degree of balance between production and consumption, into national and regional (or sub-regional) products and services. In this connection, for example, the manufacture of aircraft or machine tools, which is calculated in a comparatively limited number of areas, is classified as national branches of the economy when these types of production are utilized on a national scale, but construction, commerce, the bakery industry, etc., are classified as regional branches.

(3) The coefficients of material expenditures (the a_{ik} technological coefficients) are taken as identical for the country at large.

These propositions form the basis of the calculation, by means of "input-output" equations, of the scale of production in all regional branches, as well as the need for

products of the national branches in accordance with the assortment and volume of ultimate demand in the various regions.

The theory under examination suffers from at least two significant shortcomings which seriously limit the possibilities of practical utilization thereof. The first of these lies in the fact that the share of the districts in the production of each of the national commodities is deemed to be stable. It is independent of changes in the volume of production of the given product. Therefore, Leontief's methodology is applicable only on the condition that the territorial distribution of newly introduced capacities is not provided for in advance, and data as to the magnitude of differentiation of the technological coefficients by regions is lacking. It hardly has to be noted that such a condition cannot be termed a rule. It can be permitted only in the first stage of economic analysis or projections into the future, and therefore only for very crude estimates covering a limited group of branches of the economy. For the bulk of the extractive industries as well as for industries in which the materials employed constitute a major factor in processing fields, this condition is inapplicable. It is particularly unsuited to countries whose economies are in a continuous state of development, where there are no capacities that are not in use due to economic factors, and where planned efforts to improve the economic geography of production are underway.

Another shortcoming of this method lies in the fact that it is chiefly applicable to the investigation of balance ties between the region under examination and the rest of the country as a whole, and not with each other region in particular.

The model adduced in the compendium under review is not the only model of inter-regional ties by the "input-output" method. A number of additional models of this type also exist. Let us briefly note the features of some of them. Thus, the models suggested by W. Izard (3), envisage a nomenclature of the over-all national column-and-line balance in which products are listed not only by types but by site of production. For example, in the construction of such a column-and-line balance for the USSR, the steel melted at Magnitogorsk and the steel melted at the Kuznetsk integrated metallurgical industries would be listed in different positions as different products. Thus, W. Izard's model reflects not only the technological ties among branches of industry but ties along the lines of deliveries of means of production between districts: territorial ties. W. Izard's model requires considerably more statistical data than do other models of inter-regional ties. It is therefore not accidental that the book under review sets forth the results of extensive elaboration of statistical materials performed by W. Izard within the framework of the inter-regional model of W. Leontief, rather than Izard's model as such.

While W. Izard's model might serve as a means of centralized analysis of inter-regional ties, analysis with respect to a single region is better served by the model of F. Moore and D. Peterson worked out for the state of Utah. (4) This model has more in common with that of W. Leontief than it has with that of W. Izard. However, Moore and Peterson make a distinction between regional and national branches not only in terms of the output of products but in terms of the sources of material inputs. They introduce local coefficients for material inputs for production in the given region instead of national coefficients. This represents something of an improvement of W. Leontief's scheme. By comparing regional and general national coefficients of material expenditures, it is possible to derive an idea as to which commodities should, from this point of view, desirably

be produced in the given region, and which it would be desirable to import.

H. Chenery's inter-regional model is of interest for studying the ties between two or more regions (as distinct from the ties between a region and the rest of the country). The essence of Chenery's model lies in the fact that he approaches a region from the point of view of its commercial ties to other regions. In Izard's model, the material outlays of a given region are met by deliveries from other regions in the most varied proportions. This pertains equally to deliveries for purposes of production to be carried out within this very region. In contradiction to this, Chenery's model examines deliveries from other regions only to the degree that they supplement the production of the given region. The share of the various regions therein is taken to be stable. Chenery's model was utilized to study relationships between the north and south of Italy.

Studies in the field of analysis of inter-regional ties by the "input-output" method were undertaken later than studies in the field of inter-branch ties and are still, for all practical purposes, in the experimental stage. Analysis of economic interrelationships among large numbers of districts has not yet been carried out. Nevertheless, the experience accumulated in analysis of inter-regional ties on the basis of balance schema employing the "input-output" method deserves careful examination.

As we have already noted, the third and fourth parts of the book are devoted to the elaboration of indices needed for investigations by the "input-output" method. Chapters 6 and 7 examine the structure of fixed capital in the economy of the United States and methods of determining the coefficients of capital expenditure B_{ik} (in our economic practice, this coefficient is called the coefficient of unit capital investment).

Major attention in this chapter is given to the validation, methodology, and results of computations of indices characterizing the relationship between investments in the fixed and circulating capital of the branch of industry and the cost of production therein. These indices-coefficients of capital input are used in dynamic models to determine the total volume of capital investments required to increase the output of the product by a given magnitude. In this connection, the author of the chapter, R. N. Grosse, indicates that the corresponding indices are most desirably calculated from the basis of the magnitude of the investments made in the last several years, and of the increase in production attained, as a result of these investments. This approach results in the development of coefficients of capital input that describe conditions most nearly corresponding to those of the present day. For concrete calculations, this method requires refinement. In the first place, it is necessary to remember that this coefficient varies from region to region as concerns a large number of branches of industry. Further, at the present time, when the rate of technological progress is particularly high, one cannot be satisfied only with calculations based on the indices of the last few years. Nor is it justified to extrapolate report data into prospective calculations without corresponding corrections. In this situation, the most accurate calculation would be one that is made on the basis of planning data. Finally, the results obtained on the basis of indices reflecting the total sum of capital investments and the total increase in production are not beyond criticism in yet another sense, that these indices include expenditures for reconstruction and therefore for additional output resulting from reconstruction.

In the practical working of our efforts in the field of economics, the relationships between the output of product and

the magnitude of circulating capital is systematically established by calculating indices of rotatability of circulating capital, but virtually no calculations are made of the relationship between the volume value of the products and the value of the fixed capital. At the present time, when the competition between the socialist and capitalist economic systems has entered its decisive phase, and when the time factor takes on the very greatest importance, the utilization of these indices along with indices for the recouping of capital investments would be of definite significance. In particular, it would be desirable to calculate how much production the national economy acquires per ruble of investments in fixed and circulating capital in the various branches of industries, and also to compare these indices with the corresponding indices of other countries. In this connection, the table of values of fixed capital coefficients by branches of industry in the United States adduced on pages 249-250 of the book under review may be of interest.

Inasmuch as American statistics are based primarily on selected data, and many of the indices essential for investigations on the "input-output" scheme are not present in these statistics at all, there is a certain amount of arbitrariness in the calculations of the coefficients of capital expenditures. Despite this fact, the methods of determining coefficients by calculation may, in a number of instances, prove useful for our economists.

As he deals with a capitalist economy, R. Grosse is required to consider the conversion of the finished products into commodities on the shelves of the manufacturing enterprises. Therefore, in determining the coefficient of circulating capital, he includes in the circulating capital of the branch of industry the finished product designed for use in that branch of industry but temporarily in the warehouses of enterprises in other branches of industry that are the manufacturers of this product. However, in so doing, the author ignores the fact that a portion of these supplies may never reach the consumers at all.

In the fourth part of the compendium under review (chapters 8-11) questions of engineering calculation of coefficients of current material and labor inputs are examined for purposes of studies utilizing the "input-output" method (of coefficients), and questions of classification of branches of industry under the scheme are also examined. The method for engineering calculations is determined by the fact that the experimental, statistical data are not always available in the first place, and in the second place they are not always suited to investigation, particularly long-range investigations.

Engineering calculations as applied to economic investigations are adduced by the means of discovering and making quantitative determination of the ties among various factors, primarily technological, on the one hand, and the output of products, the structure and level of expenditures, etc., on the other. The chapters presently under discussion set forth the general principles of determination of such ties and derive mathematical formulas for the measurement thereof.

The author of chapter 8, H. B. Chenery, provides a theoretical preface to his presentation of his specific method of calculating production functions. In this introduction, he offers a definition of production and the productive process which is clearly taken from vulgar political economy. He writes: "for the economist, 'production' signifies everything that is done with an object (or a group of objects) so as to increase its value" (page 399) (retranslated from the Russian).

Further it is asserted that the production process is a series of changes in energy" (page 340). The significance

of energy in its various forms for the production process is obvious. But to reduce the latter only to various forms of utilization of energy is completely false. The expenditure of energy is an important and even required condition of production, but it is by no means the sole condition, nor the determining one. It is only a condition and not the content of the process of production. Marx showed that production consists of the fact that a worker acts with tools of labor upon an object of labor. When Marx examined the machine, he identified three major portions thereof: the source of motive power, the transmission mechanism, and the tool, and particularly emphasized the decisive significance of the tool portion of the machine.

In view of the importance of deriving the a_{ik} coefficients by calculation, the efforts made by the authors in this direction are deserving of attention. However, both the results achieved and the future prospects of investigation in this field require examination with the utmost caution. In the first place, it is necessary to note that the factors capable of being determined quantitatively and included in the calculation do not by any means exhaust the list of those involved.

The authors themselves are compelled to recognize this in some cases. Further, in view of the complexity of modern production, where a large number of the most various factors are at work simultaneously, it is necessary, in such calculations, to fall back upon a number of various conventions, as the result of which the accuracy of the initial data proves to be considerably below the accuracy of the calculations themselves. For example, in determining the expenditure of fuel for commercial aviation, the author of chapter 11, A. R. Ferguson, makes use of so many approximate estimates that if the result of his calculations differs by only 5% from the factual data, this, far from convincing one of the accuracy of the method, compels one to think in terms of the possibility of accidental coincidence. The more remarkable therefore is the conclusion to the effect that this difference "is explained in part, apparently, by some errors made in our calculations," (page 510) (retranslated from the Russian).

In chapter 9 (the author, M. Holzman), problems of classification of the branches of the national economy for "input-output" diagrams are dealt with. Here, however, as in other places in the book, no validation of the system of classification in terms of political economy is presented. Suffice it to say that this chapter completely avoids the question, of fundamental importance, of criteria for delimiting the branches in the productive from those in the unproductive sphere. In examining practical aspects of the problem, M. Holzman points to the difficulty of creating "a perfect classification" due to the need for simultaneous consideration of such problems, existing on different planes, as the purpose of products and the structure of their costs of production, the multiplicity of dimensions of the properties, from the viewpoint of consumption, of the overwhelming majority of the products, and the inadequacy of statistical information. In describing in detail the difficulties that arise in developing classifications, the author provides only a small amount of information in terms of the methods to be followed in overcoming them. The grouping of various branches of activity on the principle of homogeneity of the process of production, and the introduction into the classification of arbitrary branches (the branches covering so-called manufacturing services) regardless of the branches in which these services are performed, is of interest. "The production of energy" and "conservation" are classified in this category. Classifying metal working as a branch in the field of manufacturing services, the author derives

productive functions for it. However, the utilization of productive functions is difficult in view of the scope of this branch of industry and the multiplicity of dimensions of its production. The author's error lies in having set up an excessively large classification branch. It should be stated that if the classification were broken down into further detail, the utilization of the method of singling out departments of manufacturing services might, in our opinion, yield positive results. Services of this kind are numerous in modern production. By way of example, let us refer to the fine grinding of various metals or, grinding by vibration, if one wishes to break this branch down even further.

The fifth part of the book is devoted to defining the structure of ultimate demand for products to be consumed outside the field of production. The importance of this problem for constructions by the "input-output" method is determined particularly by the fact that if the dominant portion of the structure of ultimate demand is established with sufficient accuracy, the number of unknowns in the "input-output" table is significantly reduced. This makes for a more closed system and improves the reliability of the calculations, as to a considerable degree it eliminates the influence of subjective estimates upon the results thereof.

The authors of chapter 12, D. S. Dusenberry and H. Kisten, point out with justification that the structure of the ultimate demand for objects to be consumed outside the field of production depends upon level of incomes, the level of prices, the age, sex, and territorial structure of the population and upon such a factor as change in taste under the influence of fashion. However, they are not capable of going beyond these trivial assertions. Whereas the object of investigation in the preceding chapters of the compendium under review consisted chiefly of technical and economic relationships, in this chapter an effort is made to investigate social and economic ties. It is therefore not remarkable that it is precisely here that the bourgeois limitations of the authors of the compendium manifest themselves most clearly, as do the defects in the "input-output" scheme, as far as second, third and fourth quadrants are concerned.

A scientific solution of the problem under examination is possible only on the basis of Marxist-Leninist political economy. Marx and Lenin always held strictly to the class analysis of the incomes of the population of capitalist countries and demanded a sharp delimitation of the incomes of the working people from those of the capitalists. As Marx showed in "Capital," all the production in department two of social production consists of means of consumption, the bulk of which is required by working people, and luxury items which are consumed by capitalists. Only by differentiating the incomes of working people and capitalists and by carrying out an accurate economic grouping of the products designed for unproductive consumption can one successfully analyze the structure of ultimate demand. The importance of such differentiation is testified to, specifically, by the fact that in the United States, the production of luxury items represents 31 billion dollars per year, or about 10% of the national income.

It goes without saying that one cannot expect a scientific approach to this problem from bourgeois scientists such as the authors of the compendium under review. Nevertheless, some of their ideas with respect to determining indices for the structure of ultimate demand are deserving of attention. As is noted in the book, the tastes of consumers are

variable by the very nature of things. And it is most difficult to determine their influence upon change in the structure of ultimate demand. The situation is somewhat different when we examine factors subject to quantitative determination, particularly when we deal with changes in income and price levels. In this connection, the authors employ the so-called "coefficient of price elasticity" which is encountered in other works on econometrics as well. These coefficients show how greatly the structure of consumption of various products changes with changes in price. Thus, let us say that the coefficient of "price elasticity" in the case of meat, which is 0.5, shows that when the price of meat rises 40%, its consumption diminishes by 20%, whereas if the price drops 30%, consumption increases by 15%. Similar coefficients can be employed not only with respect to change in prices, but also with respect to change in income levels.

The book is written in a difficult and to some degree in a precious language. In the translation into Russian the publishers did not concern themselves with the problem of glossary. A number of terms and facts that are little-known have been provided with no explanation. The publisher's preface also includes inaccurate statements. For example, it points correctly to the relationship between W. Leontief's constructions with the balance studied performed by Soviet economists as far back as the 20's, however, the "input-output" method is called "Leontief's method." Leontief actually did carry out a considerable work in the "input-output" method, but to call this method by his name is, in our opinion, unjustified. The preface also contains the inaccurate assertion to the effect that "Leontief's method permits determination of coefficients not only statistically, on the basis of data contained in final reports, but by methods of pure calculation..." (page 3). The coefficients under discussion, direct or covering total inputs, are not identified. The coefficients for total inputs cannot be obtained statistically on the basis of data in final reports. They are calculated by the solution of a system of equations based on coefficients of direct inputs. With respect to the coefficients of direct inputs, they too cannot be calculated by means of the "input-output" method. Coefficients of direct inputs are the starting point of constructions based on this method. However, the "input-output" method does not itself yield methods of determination of these coefficients.

As has already been noted above, the incorrect initial political-economic standpoints of the authors of the book under review have led them to incorrect constructions and conclusions in many instances. A number of its shortcomings are, also, a consequence of the complexity and relative novelty of the problems under examination. Therefore the book requires a critical approach.

Literature Cited

- (1) See: Problems of Economics, No. 10, 1958, page 29 (Russian Edition).
- (2) See: Problems of Economics, No. 12, 1957, pages 139-149, for calculation of coefficients of total input and for the utilization thereof in planning.
- (3) Review of Economics and Statistics, November 1951.
- (4) Review of Economics and Statistics, November 1955.

Amuel Kheynman:

Technological and Economic Tendencies in the Structure of Industry in the United States of America

The USSR has entered a new and most important stage in development, the period of all-out upbuilding of communist society. The 21st Congress of the Communist Party of the Soviet Union defines as its major objectives of this period: the creation of a basis for communism in material technology, the further reinforcement of the economic and defense capacities of the USSR, and simultaneously, the fuller satisfaction of the rising material and spiritual needs of the people. The next ten years should see the solution of most of the historical objectives of overtaking and surpassing the most advanced capitalist countries in production per head of population. Solution of the major economic problems of the USSR will signify a triumph of socialism in peaceful competition with capitalism, of significance in world history. The long-range plan for the development of the economy of the USSR for the coming 15 years envisages that our country will overtake the United States within that span of time both in volume of industrial production and in output per head of population.

A scientific investigation of the path to be followed in solving the basic economic tasks of the USSR cannot reduce itself to a comparison of the absolute scale of production and of the production per head of population in the USA in the most important branches of industrial production. This kind of approach permits only a clarification of the scale of the problems posed, but does not answer the question of the most efficient methods of solving the problem.

The root problem of the current seven-year plan is the problem of maximum gain of time in the peaceful economic competition between socialism and capitalism. The efforts of economists should be directed towards seeking out paths that would permit the most rapid and efficient solution of the fundamental economic problems.

Realization of the problems of catching up with and surpassing the most economically developed capitalist countries in level of output per head of population does not mean that the USSR will reproduce the structure of the American economy. Without speaking of the fundamental social and economic differences between socialist and capitalist systems, the departmental structure of industry and the entire economies of the USSR and the USA are characterized by features unique to each, conditioned by such objective factors as the natural and historical conditions of development of the given country, as well as the fundamental differences in the international division of labor under the conditions of socialism and capitalism.

The problem facing Soviet economic science is to investigate both the social and economic principles inherent in modern capitalism and the technological and economic tendencies of development of industry at the present stage in technological progress, which, with certain modifications determined by the social and economic conditions of monopoly capitalism, manifest themselves in American

industry as well. What we are speaking of are the changes in the departmental structure of industry as a whole and, particularly, in the machinery manufacturing industry, the shifts that have occurred in the structure of the tools of labor, produced by modern industry. Under the conditions existing in the American economy, these progressive changes carve out a road for themselves spontaneously, and their realization is accompanied by the breakup of small firms and increased unemployment, and under-utilization of and sharp fluctuations in the utilization of productive capacity. Giving new attention to the fundamental contradictions between the social and economic conditions of the USSR and the USA, Soviet economists should at the same time make a careful study of the structural changes that have occurred in American industry in the past thirty years, during which time the volume of industrial production in the USA rose from a level approximately equal to that of the present volume of production in Soviet industry to its present level. A critical utilization of this material can be of significant value in determining the path of development of industry of the USSR.

The purpose of the present article is to trace the technological and economic shifts in the industry of the United States, which are of greatest interest for the study of the prospects of development of Soviet industry. At the same time, attention should be given in the first place to those distinctive characteristics of the development of American industry which are determined by capitalist relationships of production and have nothing in common with the technological and economic tendencies conditioned by engineering progress.

In the first place, low and ever slower rates of increase in industrial production are characteristic of American industry. During the final 37 years of the 19th century, the average annual rate of increase in industrial production was 5.8%. During the first 30 years of the 20th century, up to the high point preceding the crisis of the 30's, it dropped to 4.5%. During the second 30 years of the current century the average annual rate of increase in the USA was 2.9%, and during the past decade 2.6%, whereas the period 1953-1958 shows no increase in production in American industry at all. This has been the dynamics of American industry for the past century.

As we know, Soviet industry surpasses American not only in rates but in absolute volume of increase in production. The results of the past decade reflect this qualitatively new stage in the development of the economic competition between the USSR and the USA.

The second distinctive characteristic of American industry is the cyclic character of its development. Over the past hundred years the alternation of decline due to crises and feverish booms regularly became more pronounced, and in the most recent years this has manifested itself most intensively. This is testified to by the following data. At the end of the past century, the level of industrial production was greater than that during each preceding year in almost two-thirds of the total number of years (24 out of 37). During the first 29 years of the 20th century, this was true of only 59% of the total number of years (17 of 29). During the last 29 years (subsequent to the crisis of 1929), only 28% of all years (8 years out of 29) revealed an increase in industrial production to a level higher than that previously

obtained. Finally, during the 13 postwar years, only 3 witnessed an increase over the level of production previously obtained.

These are indisputable facts. The constant alternation between crisis declines and feverish booms, Comrade Nikita Khrushchev observes in his report at the 21st Congress of the CPSU, "testifies to the instability of the capitalist economy. Neither the arms race nor any other measures can liberate the economy of the USA and the other capitalist countries from crises of overproduction. No matter what the capitalist governments may do, they cannot eliminate the causes of crises."

An important peculiarity of the development of American industry during the postwar years is the forced growth of war industry, exceeding many times the rates of growth of industry producing for peaceful consumption. According to the United States Bureau of the Census, the increase in production of all branches of the light and foodstuff industries was 6.8 billion dollars from 1947 to 1956, while the aviation industry and so-called "other inorganic chemistry" (in which military branches of inorganic chemistry dominate) showed an increase of 6.9 billion dollars.

The development of American industry in the postwar years reflects the exacerbation of the irreconcilable antagonisms between the relationships of production of modern capitalism and the progress of the productive forces. Within the framework of capitalism it is not possible to utilize the advantages of modern technology to any degree approaching completeness. Mechanization and automation of production are incompatible with a slow rate of increase of industry. As a result, a systematic forcing of workers out of industry and absolute reduction in the number of industrial workers has occurred during the postwar years.

From 1947 to 1958, while the volume of industrial production had increased by 34%, nearly one and one-half million workers were cast beyond the gates of the industrial enterprises of the United States: over 10% of the total number. American economists attempt to veil these serious consequences of technological progress and automation by reasoning to the effect that the new branches developing as a result of the progress and technology will allegedly absorb the workers driven out of the old one.

The contraction of the total number of workers in the industry of the United States from 1947 to 1958 by 1,442,000 contradicts this apologetic assertion. Moreover, even in the rapidly growing branches of industry, the number of workers is either declining or increasing quite insignifi-

cantly. The volume of production in the chemical industry rose 89% from 1948 to 1958, but the number of workers in chemical plants diminished by 13,000. In the electrical manufacturing industry in the production of electronic apparatus and instruments, an increase of 77% in production over an 11-year period was accompanied by a 6.4% rise in the number of workers, or by 43,000.

A more or less considerable increase in the number of workers has occurred in the building of transport equipment: 73,000 or 7%, while the volume of production doubled. Here, too, the over-all total concealed contradictory tendencies. A real growth in the number of workers occurred only in the aviation industry — from 175,000 in 1947 to 479,000 in 1958. In the automotive industry, the number of workers dropped by 172,000 in the same period, in shipbuilding by 19,000, and in the building of locomotives and rolling stock by 30,000. (1)

From 1947 to 1958 the number of workers in American industry dropped by almost one and one-half million, whereas the employable population increased by 14 and a half million. Thus, in the United States of America, the citadel of modern capitalism, technological progress, which contains vast possibilities for increasing the productivity of social labor, and creating an abundance of products, brings unemployment and poverty to the working class, the creator of all material values.

We have described certain distinctive characteristics of the development of American industry over the past decades. A comparison of these tendencies with the results of the development of Soviet industry, expressed in high and stable rates of growth, and in providing complete employment for the entire employable population, clearly illustrates the fundamental advantages of the socialist system over the capitalist.

Industry in the United States of America is growing at a fraction of the rate of that of the USSR. American industry is developing most unevenly. Over the past decades, as a result of the low rates of increase in production, due to contradictions in the capitalist system of economics, technological progress has resulted in forcing hundreds of thousands of workers out, and in absolute reduction in the number of workers in the industry of the USA.

At the same time, during the past three decades (1929-1958), industrial production in the USA has increased by a total of 130%, the output of the most important industrial products having increased as follows (2):

	Unit of Measurement	1929	1957	1958
Electric power	Billion KWH	116.7	715.7	716.2
Petroleum	Million Tons	138.1	353.9	327.5
Gas	Billion Cubic Meters	54.3	300.2	No data
Pig Iron	Million Tons	43.3	72.0	52.4
Steel	Million Tons	57.3	102.3	77.3
Aluminum	Thousand Tons	103.0	1,496.0	1,380.0
Cement	Million Tons	29.5	53.0	52.3
Paper	Thousand Tons	6,067.0	17,800.0	No data

The increase in industrial production in the USA from 1929 to 1957 corresponds approximately to the increase in production which is to be attained in the next ten years by Soviet industry. Therefore, an important problem facing economic analysis, along with an examination of the

contradictions inherent in American industry, and the social and economic peculiarities and consequences of its development, is a careful investigation of the internal shifts in industrial production in the USA during the period indicated. These shifts were to a considerable degree responsible for

the increase in industrial production by the United States in the years since 1929.

The dynamics of physical volume of production in the

various branches of American industry are calculated by the following data (1929 = 100) (3):

	Index of Physical Volume of Production		1957 as % of 1947	1958 as % of 1948
	1957	1958		
Electric power	613	614	233	213
Coal	82	67	74	63
Petroleum (including natural gas)	292	274	158	134
Extraction of metallic ores	101	80	115	87
Pulp and paper	298	304	159	157
Chemical	536	536	190	176
Coal and oil processing	291	275	145	128
Rubber	287	267	127	122
Ferrous and non-ferrous metallurgy	164	131	127	98
Production of metal products	211	194	135	123
Manufacture of machinery (excluding the electrical engineering industry and the manufacture of transport industry)	300	256	144	120
Electrical engineering and electronics industry	448	394	202	177
Transport machinery	380	338	222	183
Instruments and precision machinery	397	377	172	156
Production of stone, sand, clay and glass products	295	278	158	138
Foodstuffs	172	177	111	116
Tobacco	187	197	112	116
Textiles	172	170	98	93
Clothing	194	192	115	108
Forestry, lumber	101	101	114	109
Furniture	143	142	120	115
Printing and publishing	208	206	151	135
Leather	120	117	98	102
All industries	243	228	143	129

The foregoing data show that the most rapid rates of increase during the period under examination were recorded in electric power, chemistry, tool manufacture, electrical machinery, and electronics. Moreover, the development of electric power production considerably exceeded the increase in volumes of production in each of the other branches.

While the volume of production of industry as a whole increased 130% from 1929 to 1958, the output of electric power increased 510%, the output of chemical goods, which is firmly in second place in rates of growth, increased more than 400%. The volume of production in the electrical engineering and electronics industry increased 300%. The production of tools and precision mechanics products increased 280%.

Transport machinery manufacture is in fifth place in rates of growth of production. The volume of growth in this branch rose 240% in 30 years (280% from 1929 to 1957). The aviation industry played a decisive role in the development in the manufacture of transport machinery. The share of aviation industry in the total value added by manufacture of transport machinery rose from 10.4% in 1939 to

41.5% in 1956. The production of automobiles dropped to 7,200,000 in 1957 and 5,100,000 in 1958, returning, that is, to the 1929 level, after a sharp rise in 1955 (when 9,200,000 machines were produced, as against 6,300,000 in 1929). The manufacture of locomotives and railway cars, and shipbuilding, also increased slowly.

The next positions in terms of rates of increase are occupied (our sequence is in terms of the increase from 1929 to 1957, or in other words, prior to the critical drop in 1958, as this more fully reflects the normal proportion in the developments of the branches of industry): by manufacture of machinery (except for electrical machinery and transport equipment), the paper and pulp industry, the production of stone, clay and glassware (this group includes the major building materials), the extraction of petroleum and natural gas, the chemical processing of petroleum and coal. All these industries approximately tripled in production from 1929 to 1957 (their increase from 1929 to 1958 was between 160% and 200%).

An absolute drop in coal extraction along with a considerable increase in petroleum output and a particularly sharp increase in natural gas output is characteristic of industrial

production during the period under examination. This is evident from the data shown in the following table.

The structural shifts in steel production have given rise to fundamental changes in the power balance of the USA. From 1930 to 1955, the share of hydroelectric power

remains stable (3.5% and 3.8% respectively), the share of coal fell by more than half — from 61.3% to 29.5%, the share of petroleum increase considerable — from 25.4% to 41.2%, and the share of gas increased by over 150% — from 9.8% to 25.5%.

Years	Coal		Petroleum		Natural Gas	
	Million Tons	% of 1929	Million Tons	% of 1929	Billion Cubic Meters	% of 1929
1929	552	100	138.1	100	54.3	100
1939	405	73	170.9	124	71.9	132
1947	624	113	254.4	184	129.8	239
1957	468	85	353.9	256	300.2	552
1958	377	68	327.5	237	No data	No data

An important feature of the development of American industry during the period under examination is the relatively slow rate of increase in the production of the metal industries, primarily the iron and steel industries. Of the 23 branches of industry in the table on page 67, the metals industries occupy 18th place in the growth chart for 1929-1957, 19th place for 1929-1958, and 13th place for 1947-1957. The melting of ferrous metals is growing more slowly than the industry as a whole, and even more slowly than the production of the metal-consuming branches of industry, while the production of steel grew 78.4% from 1929 to 1957, the production of all the metal-consuming branches of industry increased 240%, and the volume of production of manufacturing as a whole increased 120%. This is explained by the ever greater utilization of lightened rolled shapes, the systematic reduction in the weight of machines, accompanied by an increase in efficiency, and the introduction of progressive technological processes, precision casting and the press working of metal, which tends to reduce scrap and, finally, the ever more intensive use of synthetic materials, plastics in particular, in the machine manufacturing industry.

The shifts we have noted in the departmental structure of American industry are also manifested in the positions occupied by the various branches of industry as to volume of production. Of the 44 most important branches of industry, the auto industry took first position in the 1939-1956 period. (there are no comparable data for earlier years), and the iron and steel industry was in second place. The aviation industry moved from 40th place in 1939 to 3rd place in 1956, organic chemistry from 19th to 4th, the manufacture of electronic apparatus and instruments and communication equipment from 29th to 5th, the production of industrial electrical equipment from 15th to 6th, the production of metal-working equipment from 18th to 7th. The petroleum refining and the paper and pulp industries moved from the 7th to the 8th, and from the 8th to the 9th places, respectively. The industry producing metal manufactures for construction moved from 23rd to 11th place, the construction of equipment parts moved from 26th to 15th place, and inorganic chemistry from 33rd to 21st. It should be emphasized that despite the comparatively slow increase in the production of ferrous metals, ferrous metals metallurgy continues to be firmly in second place (after the automobile industry) among the branches of industry in the United States.

Let us proceed to a more detailed analysis of the structure of production in the more important branches of American industry.

Analysis of tendencies in the development of power production, and of electric power primarily, is of major importance. As already observed above, the production (and also the consumption) of electrical energy increased from 116.7 billion to 716 billion KWH from 1929 to 1958. This increase was conditioned to no small degree by the considerable increase in economic efficiency of utilization thereof. The dynamics of wholesale prices for electric power and for various types of fuel are described by the following data. (1926=100). (4) While the price of coal rose 140% from 1929 to 1958 and that of petroleum by 50%, gas prices dropped 3% and the price of electrical power dropped 29%. This relationship in price dynamics was reflected in the structure of the expenditures of American industry for fuel and electric power.

According to the Census of Manufacturing Industries of the USA in 1929 and 1954, the structure of fuel consumption (except coke, which is used almost entirely for industrial technology) and purchased electrical energy (measured in value) changed as follows: the shares of expenditures for gas in the total volume of expenditures on fuel and energy rose from 12% to 21%, that on petroleum products from 12.3% to 14.4%, for purchased electrical energy from 27.5% to 42.1%, and the share of expenditures upon coal diminished from 46.1% to 16.8%. (See table on top of the following page.)

Along with the change in the structure of consumption of fuel and energy resources in manufacturing industries characterized by a sharp increase in the share going to electric power, serious changes occurred in the utilization of primary energy resources in the electrical energy field itself. The data presented in the table at the bottom of the following page, embracing public utility power plants (7) which produced 61.4 billion KWH in 1957, or 80% of the total output, illustrate these shifts (as percent of total).

In 1957, of 631.4 billion KWH produced by public utility power plants, over 100 billion KWH represented natural gas and 40 billion KWH represented petroleum and fuel. The public utilities hydroelectric plants produced 130 billion KWH of electric power.

During the period under examination, there was a considerable increase in the share of public utilities power plants and a corresponding decline in the share of electric power produced by power plants owned by industrial enterprises, transport, and other branches of industry. In 1940, the share of public utilities power plants in the total output was 79%, whereas in 1957 it was 88%. There was a considerable reduction in the fuel consumption (consumption of a conventional fuel unit per KWH diminished from 726 grams in 1930

Years	Electricity	Gas	Petroleum	Coal (5)
1929	94.5	93.1	71.3	91.3
1939	78.6	84.1	52.2	97.5
1947	65.0	85.0	90.2	157.6
1958 (6)	67.0	90.0	120.0	220.0
1958 as % of 1929	71.0	97.0	168.0	241.0

422 grams in 1957), (8), and the number of hours during which installed capacity was in use increased. 2,813 KWH were produced in 1930 per KWH installed capacity, while in 1957 the figure was 4904 KWH. (9)

The consumption of electrical energy in manufacturing industries increased at rates considerably more rapid than the rates of increase in production for those of growth of poor productivity. Whereas the volume of production increased 150% from 1939 to 1956, industrial power consumption grew by 360%, or in other words, faster by a factor of 3.6 than the increase in the physical volume of production. The consumption of electrical energy per worker also increased 1.86 times faster than production per worker.

An important factor determining the major changes in the consumption of electrical energy in American industry has been the internal shifts in industry. Four groups of industries (the chemical, metallurgical, paper-and-pulp, and transport machinery building) account for more than 80% of the increase in power consumption. From 1947 to 1954 the growth in power consumption of these branches was 816 billion KWH, and in industry as a whole it was 106.8 billion KWH. The corresponding figures for 1947-1956 are 142.7 and 182.4 billion KWH.

A decisive role in the increase in power consumption in the chemical industry was played by the arms race. Virtually three-quarters of the entire increase in the consumption of electrical energy in this branch of industry from 1947 to 1954 (30.3 billion of 40.6 billion KWH) was accounted for by enterprises of "other inorganic chemistry" which includes plants manufacturing atomic and hydrogen weapons. The consumption of energy in this branch was 34.9 billion KWH in 1954, or 588 thousand KWH per year per worker.

To offer some framework for this figure, let us point out that the consumption of electrical energy per worker during the same year in the entire chemical industry was 122,000 KWH, and in the entire manufacturing field - 20,000 KWH. While the pure product of this industry, as conventionally described, was 0.9% of the pure product in manufacturing industry as a whole, its share in industrial electrical power consumption was 14% (34.9 billion KWH of 247.7 billion KWH).

In the metals industries, over two-thirds of the entire increase in the consumption of electric power (17.8 billion of 27.1 KWH) was on the part of enterprises smelting non-ferrous metals (including 16.2 billion KWH at aluminum and copper refineries). Thus, two branches of industry alone - "other inorganic chemistry" and non-ferrous metallurgy -

accounted for a 48 billion KWH increase in electric power consumption from 1947 to 1954, amounting to 45% of the entire rise in electric power consumption in the industry of the USA.

The iron and steel industry is also a very great consumer of electric power. At plants in this industry (not counting those engaged in smelting by electricity), electric power consumption in 1954 was 21.4 billion KWH, while that of the paper and pulp industry was 20.9 billion KWH, that of the petroleum refineries 9.2 billion KWH, that of "other organic chemistry" 7.2 billion KWH, that of the automotive industry 6.3 billion KWH, that of the cement industry 5.7 billion KWH, and that of the aviation industry 4.3 billion KWH.

Along with the shift in structure, the major factor in the increase in power consumption in United States industry was the considerable rise in the electric power available through these branches of industry. The consumption of electric power in American industry (excluding the rubber and electrical engineering branches) increased considerably more rapidly than the physical volume of production, and the availability of energy to labor increased more rapidly than labor productivity. On the average, the consumption of electric power and the availability of electricity to labor increased 60% faster in 1947-1956 than the physical volume of production and than production per worker.

It is typical that the difference between rise in power consumption in volume of production is lowest in the industries that are technologically most advanced. In the electrical manufacturing and electronics industry, as well as in the rubber industry, the consumption of electrical energy increased more slowly than the physical volume of production. In general, in the general machinery and transportation industries, electric power consumption grew 14% more rapidly than the growth in production, while the corresponding figure was 11% in the paper-and-pulp industry, 9% in the rock, sand and clay products industries, and 26% in the petroleum and coal processing industry. In the textile, clothing, leather and leather-footwear industries, and in the manufacture of metal products, this differential was 33-36%, and in the foodstuffs, furniture, and tool industries, as well as in metallurgy, it was even greater (41-45%).

A particularly intensive increase in the consumption of electric power and in the unit consumption of electrical energy per unit production is to be observed in the chemical, woodworking and lumber industries. In the chemical industry, an 83% increase in the volume of production was accompanied by a 430% increase in power consumption. This

Primary Resources of Energy	1930	1940	1945	1950	1956
Coal	55.8	54.6	51.7	47.1	54.9
Petroleum	3.1	4.4	3.5	10.3	6.4
Gas	6.9	7.7	8.9	13.5	18.1
Hydroelectric energy	34.2	33.4	35.9	29.2	20.6

ratio testifies not only to the technological re-equipment of this branch of industry, but to the major shifts in the nature of production in certain fields of chemistry.

The influence of shifts in the departmental structure of industry upon the volume of power consumption may be described by the following typical calculation. Had the consumption of power per unit of output in 1947 been governed, in all branches of industry, by the rates actually recorded in 1956, the total volume of power consumed in industry as a whole would have been 214.6 billion KWH. In actuality, the industrial consumption of power in 1947 was 140.9 KWH. Thus, the increase in the rate of consumption of power per unit output resulted in a rise of 73.7 billion KWH in the power consumption in American industry from 1947 to 1956. During this period, the total consumption of electric power in industry increased by 182.4 billion KWH. Consequently, all the rest of the increase — 108.7 billion KWH or 60% of the total increase — was the result of changes in industrial

emphases. It should be borne in mind that in the calculation we are presenting, only shifts in what might be called macro-departmental structure are reflected where, for example, the chemical or metallurgical industry is taken as a unit. Moreover, considerable changes are also in progress within the departmental groups. Thus, the share of the aluminum, the magnesium, the titanium and other branches is increasing in the metals industry, and there is an increase in the share of the progressive branches in chemical industry, etc. It is not possible to calculate the influence of these changes upon the increase in electric power consumption. There can be no doubt that on the whole, changes in the departmental structure of industry account for more than 60% of the entire increase in power consumption.

Tendencies in the development of the production of various metals in the USA are of considerable interest. (10)

	Unit of Measurement	1929	1939	1947	1957
Pig iron	Million tons	43.3	32.3	54.6	72.0
Steel	Million tons	57.3	47.9	77.0	102.2
Aluminum	Thousand tons	103	148	519	1,496
Blister copper	Thousand tons	999	698	857	1,069
Zinc	Thousand tons	567	460	728	895
Metallic magnesium	Thousand tons	0.6	3	11	73.7
Lead	Thousand tons	637	404	400	302
Ferro-titanium	Thousand tons	—	13	305	496
Cobalt	Tons	—	0.8	293	1,877
Cadmium	Tons	—	2,001	3,632	4,785
Nickel	Tons	279	503	828	9,136
Molybdenum	Tons	1,689	15,564	12,919	27,558
Chromite	Tons	82	2,705	366	139,031
Tungsten	Tons	303	2,296	2,077	5,910

The table shows that the smelting of pig iron in the United States increased 66% from 1929 to 1957, and that of steel rose by 79%. The production of the non-ferrous metals, particularly magnesium, aluminum, and nickel, increased considerably more rapidly. Aluminum smelting reached 1.5 million tons in 1957. Zinc production rose by more than 50%. The production of copper was practically stable (a 7% increase). The melting of lead dropped by more than half. The production of titanium, cobalt, cadmium, molybdenum, chromites, and tungsten increased at a spectacular rate, as they have only recently acquired industrial application as a result of the progress of technology. Despite the high rate of increase in the production of the non-ferrous and rare metals, pig iron and steel predominates in the over-all production of metals. Therefore it is necessary to give more detailed attention to tendencies in the development of the iron and steel industry.

Although the open hearth process continues to predominate in steel melting (open hearth steel was 91.9% in 1940, and 90.2% in 1957), the share of electric steel increased considerably. In 1940, 1.5 million tons of steel were melted in electric furnaces, or 2.6% of the total production, whereas in 1956 the figure was 8.3 million tons, or 7.9% of the total. The production of alloy steel increased during this period from 4.5 to 9.4 million tons, and their share in the total melting increased from 7.4% to 9.0%. Oxygen is acquiring ever-widening application in the steel melting industry. The consumption of oxygen per ton of steel melted rose from 0.92 cubic meters in 1930 and 1.54 cubic meters in 1940, to

5.66 cubic meters in 1957. A major peculiarity of the development of the rolling mills in the United States is a considerable increase in the share of rolled sheet, and particularly thin sheet, in the over-all production. In 1937, rolled sheet constituted 46.5% of the total output of the rolling mills, and in 1956 it represented 55.2%. Finished sheets increased correspondingly from 21.3% to 32.8%. Moreover, the share of cold rolled sheets in the total output of thin rolled sheet increased from 30% to 58%.

It would be wrong to explain the high percentage of production of rolled sheets in the USA by the requirements of the automotive industry. In 1956, 75.5 million tons of rolled metal were shipped to consumers, and when one subtracts that shipped to the automotive industry, this still comes to 62.7 million tons. This final figure includes 29.3 million tons, or 47.5% of the whole, which was rolled sheet, including 14.6 million tons (23.3%) consisting of thin sheet.

The development of the technology of the rolling mill industry is characterized by the production of high-output continuous wide strip mills. Prior to the Second World War there were 28 continuous and semi-continuous wide strip hot rolling mills in the United States, with a total annual capacity of 16 million tons. At the outset of 1958, there were 38 such mills, with a total annual capacity of 50 million tons. These mills rolled about 80% of the total sheet produced in the USA. In 1957 a considerable number of hot rolling mills were modernized, and about 25 new mills worked up.

Let us remark upon one more significant tendency in the

development of American metallurgy — the increase in tube production. The manufacture of steel tubes in the USA increased from 4.6 million tons in 1946 to 9.5 million in 1956, in other words by 100%, whereas the total production of rolled steel during these years had increased by 75%. The production of iron tubes and fittings rose from 1,100,000 tons in 1940 to 2,300,000 in 1956.

American sources provide no data on the dynamics of the physical volume of production of various branches of the chemical industry. Therefore to describe the changes within this branch of industry it is necessary to make use of indices for the number of workers and the value of output for various years. Inasmuch as we are discussing the rates of increase in various fields of production within the industry as a whole, we make the arbitrary assumption, in utilizing indices for volume of production for current prices, that the prices of all types of products in the chemical industry have changed uniformly.

For the industry as a whole, the number of workers increased from 276,000 in 1939 to 517,000 in 1956, or by 87%. The value added by manufacture rose in these years from \$300,000,000 to \$11,600,000,000 or by 540%.

The production of plastics and elastomers increased most of all. Here the number of workers rose 160% more rapidly than in the chemical industry as a whole, and output increased 190% more rapidly. The production of insecticides and fungicides showed the second most rapid increase. Here the number of workers rose three times as rapidly, and the value added by manufacture 180% faster than in the chemical industry as a whole. The third place is occupied by "other organic chemistry," concealing a considerable portion of special military chemistry (other than production of explosives). Here the number of workers increased 110% more rapidly than in the chemical industry as a whole and the cost of production rose 90%. Fourth place is occupied by "other inorganic chemistry," including, among others, the very sharp rise in production during the last few years and also the tremendous increase in power consumption, a considerable proportion of the atomic energy industry. The number of workers in this branch rose 210% and the cost of production increased tenfold. This means that the number of workers here rose 70% more rapidly than in the chemical industry as a whole, and that the cost of production rose 60% more rapidly. The pharmaceutical industry was in fifth place, and the production of intermediate and organic dyestuffs in sixth place, with explosives production in seventh place. The production of synthetic rubber is in eighth place, and in this field a rapid rise in productivity was observed. Whereas in the chemical industry as a whole, the value added by manufacture, in these years of the corresponding years rose 540% from 1939 to 1956, with an 87% increase in the number of workers in the production of synthetic fiber, the value of the product increased by 360%, and the number of workers remained virtually stable (an increase of only 3% from 1939 to 1956). The scale and dynamics of increase in the most important types of synthetic products is characterized by the following figures. The production of synthetic resins and plastics increased from 568,000 tons in 1947 to 2,032,000 tons in 1957, or by 260%. The production of synthetic rubber rose from 496,000 tons in 1948 to 1,136,000 tons in 1957. (11) The production of rayon increased from 145,400 tons in 1947 to 432,700 tons in 1950, and in 1957 it was 1,000 tons, while the production of staple fiber was, respectively, 9,200, 138,600 and 192,800 tons. The production of synthetic fiber increased from 55,500 tons in 1950 to 33,900 tons in 1957. (12)

The paper and pulp industry developed at rapid rates. The number of workers in this industry increased from 270,000 to 461,000, or by 71%, in the years 1939-1956, and the value added by manufacturing at current prices increased from 900 million to 5 billion 500 million dollars, or by 520%. (13) The production of cellulose and of pressed and cast cellulose products shows the most rapid increase. There was most intensive progress in the production of paper and cardboard packaging. The number of workers in these fields rose from 80,000 to 161,000 during the same years. The value of paper and paper board packaging sold rose from 500 million dollars in 1939 to a billion 880 million in 1947 and then to 3 billion 560 million in 1956. The large scale of production of paper and paper board packaging has made for a considerable saving of forest products and metals.

The tendencies in the developments of the metal-processing and machinery-building industry in the USA are deserving of special attention. These branches developed considerably more rapidly than American industry as a whole, and were second in rates of growth only to electric power production and the chemical industry. From 1929 to 1956, the share of the metal working industry in processing industry as a whole rose from 31.7% to 34.8% in total number of workers, while in the value added by manufacture, it rose from 31% to 36.7%, of which the share of machinery manufactures in the total number of workers increased from 25% to 26.5%, and in value added in manufacture there was a rise from 24.5% to 28.5%.

In the years 1929-1956, the production of instruments and precision machinery rose most rapidly both in the number of workers and in value added in manufacture. The second place, as to rates of growth, is occupied by the industry manufacturing electrical equipments and technical machinery. In connection with the arms race, transportation machinery rose to first place in the rate of growth in the 1947-1956 period (due to forced tempos of increase in the aircraft industry).

A more detailed examination of the shifts in the internal departmental structure of machinery and instrument manufacture shows that the manufacture of radio and electronic apparatus and instruments took first place in rate of growth. From 1939 to 1956, the number of workers in enterprises in this branch of industry increased from 57,000 to 300,000, and the value added in manufacture rose from 149 million to 2 billion 700 million dollars. Reproduction of scientific equipment and instruments was in second place, and the reproduction of transportation equipment, primarily military aircraft, was in third place. The number of workers in the aircraft industry increased from 49,000 to 586,000 from 1939 to 1956, and the value added in manufacture from 184 million to 6 billion 700 million dollars. Fourth place in rate of growth was occupied by the production of machinery and tools (as well as of all kinds of equipment for them) for industry. Fifth place is taken by communications equipment, sixth place by household appliances and tools, seventh place by office and store equipment, eighth place by tractors, and ninth place by medical equipment.

The shifts in the structure of the branches of the machinery manufacturing field engaged in producing machines and instruments for industry are of considerable interest. Technological progress in this area showed and continues to show, unequal development. It was most pronounced in the most important field, the processes of shaping and forming. The development of systems of machines to service auxiliary processes such as transportation, engineering controls, control of equipment, manufacture of tools and

fixtures, etc., lagged behind the rates of mechanization of the basic processes of production. This led to an increase in the relative percentage of auxiliary workers engaged in transfer, inspection, the making of fixtures and repair of equipment either manually or with fairly primitive mechanisms.

During the past two decades, the development of the machinery manufacturing industry was governed to a considerable degree by the need to eliminate these disproportions. Whereas in the branches producing working machines for industry, the number of workers rose 120% from 1939 to 1956, and the value added by manufacture rose 6- or 7-fold in current prices, in the production of transportation and transferring mechanisms, the corresponding figures were 290% and 13.7 times, whereas in the branches producing monitoring and measuring instruments, the figures were 70% and 10.2.

The manufacture of conveyors and conveyor equipment increased from 30 million dollars in 1939 to 146 million dollars in 1947 and then to 325 million in 1956, measured by selling price. The value of fork-lift trucks and other loading mechanisms in industry increased from 155 million dollars in 1947 and then to 325 million in 1956, measured by selling price. The value of fork-lift trucks and other loading mechanisms in industry increased from 155 million dollars in 1947 to 255 million in 1954 and 355 million in 1956. According to the Census, about 35,000 fork-lift trucks of various types were manufactured in 1954. In addition, 4,800 portable lifts were manufactured, 42 million dollars worth of manual loading devices and trailer cars, 13 million dollars worth of metal bases and skid rollers for moving weights, and 61 million dollars worth of various types of lifting and transportation equipment for mechanizing intra-plant transfer, as well as spare parts and equipment.

In the area of general industrial equipment, the production of air and gas compressors (excluding refrigerator compressors), increased at rapid rates. The value of manufacture here rose 12-fold from 1939 to 1956, while the value of the output of all mechanisms and equipment for industry in its entirety rose 540%. These data are descriptive of the role of compressors as one of most important types of auxiliary equipment in modern industry.

The production of tools and fixtures rose with particular rapidity. The number of workers engaged in the production of metal-working equipment doubled from 1938 to 1956, and the value of the output increased 520%, while at specialized enterprises producing tools and fixtures for metal-working equipment, the corresponding figures were 360% and 14.2 times. From 1939 to 1956, the number of workers in enterprises manufacturing metal-working equipment rose from 55,000 to 111,000, while those at enterprises manufacturing tools and fixtures rose from 25,800 to 118,000. Whereas in 1939 \$42 worth of tools and fixtures for machine tools were manufactured for every hundred dollars worth of output of metal-working equipment, by 1956 that ratio stood at 97 dollars to 100 dollars.

In the production of tools and equipment the production of cutting tools rose most slowly. The value of such products manufactured for sale was nearly 300 million dollars in 1954, and 400 million in 1956, while the value of machine tools and other metal-working tools in the respective years was \$1,500,000,000 and \$1,700,000,000. The output of jigs and fixtures for equipment — chucks, retainers, etc. — increased at more rapid rates, exceeding 116 million dollars in 1956. The production of control and measuring instruments is increasing with particular rapidity (almost four-fold from 1947 to 1956, as measured in value).

The assembly and fitting of machine parts and assemblies

has been the most backward field of machine building in terms of level of mechanization. The man-hour requirements in assembly operations are very high, and not infrequently comprise more than half of the total man-hour requirements for the manufacture of machinery and instruments. In the solution of the problem of mechanization of these operations, the production of electrical and pneumatic hand tools plays an important role. From 1947 to 1956, the value of manufacture of such tools (electric and pneumatic drills and borers, electric grinding wheels, electric saws, electric and air driven wrenches, screw drivers, etc.) doubled.

The increase in specialization of production of dies, clamps, and other fixtures, as well as other types of non-standard tools and jigs, is increasing at rapid rates. All this equipment has been, and at many enterprises still is, designed to individual order. Specialized production of non-standard tools and jigs is an important factor in increasing the productivity of labor in the manufacture of machinery. The mass production of such tools and fixtures for the market rose from 379 million dollars in 1947 to one billion 200 million dollars in 1956, which is a figure exceeding by almost 20% the value of manufacture of machine tools in the USA. Patterns and flasks, molds and templets for casting ferrous and non-ferrous metals and plastics play an ever-increasing role in the metal-working industries. The time-consuming process of manufacturing this equipment engages a large number of pattern and tool departments in machinery manufacturing plants. In recent years, there has been a regular increase in the market production of industrial patterns, molds and templets, on a highly specialized basis. The value of the manufacture of these products increased from 78 million dollars in 1947 to 310 million in 1956, or in other words, fourfold. (14) Almost 73% of these products were made at enterprises specializing therein. It is characteristic that the level of specialization of these enterprises — that is, the percentage of their major products to the total product — was 93%, according to the Census of 1954. (15)

Another important tendency in the development of the American machinery-manufacturing industry is the growth in the production of electrical apparatus for mechanized and automatic control. The number of workers and enterprises manufacturing these instruments and apparatus increased 350% from 1939 to 1956, and the value added by manufacture increased 12.4 times in current prices, from 72 to 888 million dollars.

Let us examine the tendencies in the development of other branches of the metal manufacturing industry, excluding the manufacture of machinery. The most rapid increase was in the specialized factory manufacture of metal products for construction: structural fabrications, metal doors, window frames and panels. The number of workers in enterprises in this branch trebled in 17 years, attaining 241,000 in 1956.

Another rapidly developing branch of metal manufacture is the specialized production of stampings. The number of workers in enterprises in this group attained 108,000 in 1956, and the value of their output exceeded 2 billion dollars, of which 600 million dollars represented stampings for the automotive industry.

The third branch that has been developing at rates more rapid than others, is the specialized manufacture of fastenings: bolts, nuts, screws, rivets, etc. In 1956 the value of manufacture in this branch of industry exceeded one billion 400 million dollars, of which the value of specialized mass production of non-standard fastenings was 166 million

llars. Of the greatest importance for characterization of the structure of industry as a whole and of the technological changes occurring therein is an analysis of the assortment of machines and tools produced. From 1939 to 1957 the volume of metal-cutting machine tools sold increased 370% (current prices), and that of metal roll-forming equipment rose 13.7 times. The share of metal-cutting machine tools in the total volume of metal-working machinery sold dropped from 89% to 74%, and the share of metal spinning equipment increased from 11% to 26%.

Age Groupings of Metal-Working Machine Tools Installed in Industry (Percentage of Total) (16)

Years	Ages of machine tools			
	Under 10 years	Over 10 years	Including	
			10-20 years	Over 20 years
1925	56	44	No data	No data
1930	48	52	No data	No data
1935	33	67	No data	No data
1940	28	72	No data	No data
1945	62	38	20	18
1949	57	43	22	21
1953	45	55	36	19
1958	40	60	44	16

For nearly a decade and a half after the end of the Second World War, American industry saw virtually no significant replacement of its machine tools. Moreover, the period 1953-1958 was characterized by a rather rapid reduction in the absolute number of old machine tools. In 1953 there were 369,000 machine tools more than 20 years of age. In 1958, despite the entry into this age group of a considerable number of machine tools that had in 1953 been in the 10-20 year age group (estimated at 700,000 in 1953), the absolute number of machine tools in use for more than 20 years was almost 100,000 more than it had been (nearly 276,000). As a result, the share of machine tools 10-20 years of age increased from 20% to 44% between 1945 and 1958.

This is directly related to the second important tendency in the dynamics of installed metal-cutting equipment: the absolute reduction in the number of machine tools in the metal-working industry (a reduction of 234,600 from 1953 to 1958). The number of machine tools installed in enterprises manufacturing locomotives for rolling stock and transport, ships, and artillery, dropped particularly sharply (by 182,000). The number of machine tools and enterprises manufacturing metal products dropped by 60,000, and the number in the auto industry dropped 46,000.

An increase in the number of machine tools occurred in the production of general industrial equipment, turbines, and motors, and in the aircraft industry. There was an insignificant increase in the number of machine tools in the production of metal-working equipment (by 5%) and in the electrical machinery manufacturing industry (by 2%).

The reduction of the number of machine tools in a number of branches of industry (locomotive and rolling stock manufacture, shipbuilding, agricultural machinery) was related to a slowing or cessation of increase in production.

In the automobile, electrical machinery and tool branches and in the production of metal products, the reduction or stabilization in the numbers of machine tools was accompanied by an increase in productive capacities and in increase in the volume of production. Thus, in the electrical engineering industry, an 83% increase in the volume of

This same tendency may be found on analysis of the structure of the equipment currently installed in the metal manufacturing industry of the United States.

Before proceeding to examining the changes in the composition of equipment in the metal manufacturing industry, let us note the following two most important tendencies. The first of them consists of the systematic increase in age in the metal-working equipment of American industry, as is evidenced from the following data:

production took place, while the number of machine tools diminished by 20%. This is explained by a number of factors. In the first place, in all the branches under examination (except the building of automobiles), the general increase in the age of the installed machine tools was accompanied by retirement of a large number of machine tools more than 20 years old. The share of machine tools less than 10 years of age was 54.6% of the total in 1949 in the manufacture of metal products, while in 1958 it had fallen to 41%. Whereas, in 1949, there were 171,700 machine tools more than ten years of age in this branch of industry, by 1958 the number of machine tools more than 20 years of age was only 52,200. Consequently, at least 118,500 machine tools had been taken out of operation during this period. Analogous processes were occurring in electrical machinery and tool branches of industry.

During the past five years, there has been a significant replacement of the installed machine tools in the automotive industry. The percentage of metal-cutting tools under 10 years of age was 43.3% of the total in 1953, whereas in 1958 it increased to 53.8% of the total, although the total number of installed machine tools dropped by 46,300. According to our calculations, over 55,000 machine tools more than 20 years of age were taken out of operation in the years 1949-1958. These indices reflect the process of technological re-equipment of the automotive industry occurring during the first half of the fifties, and making possible the production of 9,200,000 automobiles (7,900,000 passenger and 1,300,000 trucks) in 1955. (17) The manufacturing capacity of the automotive industry increased 33% from 1953 to 1958 (18), while the total number of machine tools diminished by 27%. This was due to a considerable increase in the output capacity of the machine tools manufactured in 1948 and subsequent years, when compared to the output capacity of machine tools manufactured earlier. The output capacity of machine tools manufactured in 1958 was on the average 54% higher than that of comparable machine tools in 1948. (19) One of the reasons for the significant increase in the volume of manufacture, accompanied by a

reduction, or small increase, in the total number of machine tools, is the extensive introduction of specialized multiple-operation machine tools and automatic lines. Of 16,300 pieces of equipment of this type, 8,200, or 50% of the total, were installed in the automotive industry, and 2,100, or 13%, were installed in the production of metal products,

1,261, or 8%, in the electrical machinery industry, and 445, or 3%, in enterprises in the tool industry and precision fields. (20)

The most important changes within the installed equipment of the American metals industries are reflected in the following table (in thousands):

	1945	1949	1953	1958	1958 as % of 1945	1958 as % of 1953
Metal-cutting machine tools	1,711	1,762	1,941	1,707	100	88
Roll-forming equipment	390	455	519	499	128	96
Casting machinery	No data	17	13	12	—	92
Welding equipment	247	181	280	300	121	107
Heat-treating equipment	73	106	107	99	136	93
Machines and drums, cylinders for metal coating	7	13	12	16	229	133
Total	2,468	2,534	2,872	2,633	107	92

The cutting of metals is rapidly being replaced by roll-forming. Another progressive process in the improvement of technology is the shifting of shaping processes to the initial stages of production and the retention primarily of finishing processes in the manufacturing departments. The

number of machine tools for finishing jobs has increased sharply in the production of the machine-tool building industry of the United States, as evidenced from the following data:

	Volume of Production		1937 as % of 1939	As percent of total output of machine tools	
	1939	1957		1939	1957
Total number of metal-cutting machine tools (in numbers)					
Including:	85,719	142,421	167	100	100
Lathes	27,505	23,266	84	32	16
Planers	1,324	894	67	2	1
Grinders	18,776	63,055	336	22	44

Thus, production of lathes and planers decreased both absolutely and relatively (from 34% to 17%). The manufacture of grinders increased sharply both in absolute numbers and in percentage, these being used for finishing operations. The scale of production thereof increased 240% from 1939 to 1957, and their share of the total output rose from 22% to 44%.

In 1945, lathes were the most important category of machine tools (constituting almost a quarter of the total number installed), whereas in 1958 grinders were the most important category. In 1945, there were 471,600 lathes and planers, which are the major "chip" producers, while grinders, polishers, honing machines and lapping machines, in other words, machines removing hundredths of a millimeter and serving merely to finish surfaces already brought to rather close tolerances, numbered 440,000. The ratio between the production of lathes and finishing machine tools was 100 to 93 in 1945, but 100 to 117 in 1958. The share of boring and broaching machines is also increasing.

An important characteristic descriptive of the changes of the composition of the equipment of the metal-working industry is the growing utilization of multiple-operation and automatic lines. This group of equipment was separately

identified in the 1958 Census, and was found to number 16,300 units of which 8,300 were multiple-operation compound tools and automatic lines with machine tools in linear arrangement, 3,800 are rotary groupings and lines, and 3,800 are automatic assembly lines. 15,800 of this total were installed during the preceding 10 years, 1,800 are 10 to 20 years of age, and only 600 were in use for more than 20 years.

From 1945 to 1958, the share of power presses and forging machines dropped significantly, from 64.2% to 43.3% in the makeup of metal-spinning and forming equipment. The share of bending and shaping machines increased from 8.5% to 15.3%, that of hydraulic and pneumatic presses from 4.3% to 10%, that of riveting machines from 4.8% to 11.3% and that of casting machines from 0.5% to 3.5%.

Significant shifts have occurred in the production of power equipment and motors. The dynamics of installed capacity of public utilities power plants presents an idea of the output of steam and hydraulic turbines. (21)

Steam turbines and turbo-generators predominate in power equipment. Of the total 88,000,000 KW increase in capacity from 1931 to 1956, hydroelectric stations accounted for only 17 million KW. During the past six years

hydroelectric plants represented 15%, or 7,900,000 KW of increased capacity, which totalled 52,600,000 KW, while steam plants represented 85%, or 43,200,000 KW.

Years	Rise in installed capacity (million KW)	
	Steam plants	Hydroelectric plants
1931-1935	1.1	0.8
1936-1940	3.3	1.8
1941-1945	6.3	3.7
1946-1950	15.2	2.8
1951-1955	37.8	7.3
1956	5.4	0.6
Total for 26 years	69.1	17.0

The production of internal combustion engines is increasing rapidly. In this connection, the production of low-capacity engines (up to 3-5 H.P.) is increasing most rapidly, and there is a considerable increase in the output of the most powerful categories (100 H.P. and more). Whereas the over-all increase in the output of engines (of automotive, aviation, haulage tractor) was 14-fold in 18 years, from 348,000 to 4,924,000, the production of engines of under 6 H.P. increased 20-fold, from 215,000 to 4,231,000, and that of engines of over 100 H.P. rose 16-fold, from 4,000 to 64,000. There was a particularly sharp increase in the output of the very small engines (up to 2.9 H.P.): 3,700,000 in 1957. The production of engines of between 6 and 10.9 H.P. rose only 18% and the production of engines of from 11 to 100 H.P. diminished.

The tendency toward a significant expansion of production of small engines along with an increase in the output of the largest engines is also clearly reflected in the structure of production of electric motors. The scale and structure of the production of electric motors significantly characterizes the technical development in modern industry.

According to the data of the Industrial Census of 1947 and that of 1954, 45,300,000 electric motors were produced in the USA in 1947, and 59,400,000 in 1954, or a 31% increase. Within these totals, the production of motors under 1 H.P. rose from 43,400,000 to 57,600,000, and the production of motors of more than 1 H.P. dropped from 1,904,000 to 1,744,000. (22)

The increase in the production of small and tiny electric motors relates to the introduction of automation and mechanization of hand tools using electric drive. The most backward fields in terms of level of mechanization are the processes of finishing and assembly, transportation of raw materials and semi-manufactured goods, processes of inspection and control of the operation of equipment. Development of automation is also giving rise to a sharp increase in the demand for electrical motors of small power. Whereas the mechanization of the fundamental preparatory, processing, and shaping processes in production involves a need for a considerable number of medium power, large and frequently very large electric motors, the business of equipping the auxiliary processes, particularly the processes of production, depends upon the introduction of electric motors of small power.

The introduction of electric control and monitoring equipment has the same effect upon the structure of the electric

motor manufacturing industry. Electronic modeling and computing machines, and the great variety and complex system of servo-mechanisms, serving as the connecting link between the controlling and working machines, also constitute very large consumers of small motors.

Particularly great shifts in the structure of manufacture of electric motors have taken place during the past decade (since 1957). This testifies to the fact that the matters at issue here are the latest tendencies in technological progress.

From 1947 to 1954 the output of all-purpose motors of under 1/100 H.P. increased ninefold, from 571,000 to 5,100,000 per year. The production of all-purpose motors of between 1/100 and 1.2 H.P. increased nearly 50%, from 2,300,000 to 3,200,000, and that of electric motors of 1/20 to 1 H.P. rose from 2,600,000 to 3,700,000 per year. Although the manufacture of electric motors of more than 1 H.P. underwent an over-all decline from 1947 to 1954, the production of multiple-phase induction motors of 51-200 H.P. rose 84% (from 19,000 to 35,000) while those of 201-500 H.P. rose by 61%, and those of over 500 H.P. capacity rose sixfold (from 400 to 2,500 per year).

Serious changes have taken place in the makeup of the agricultural machinery industry. The sharp increase in mass production of so-called garden tractors of small capacity attracts attention. In 1939, the industry produced 160,000 standard wheeled tractors, 20,000 caterpillar tractors, and no more than 10,000 garden tractors. In 1957 standard wheeled tractors produced numbered 231,100 (a growth by 24.5%), caterpillars numbered 32,900 (a growth by 63.5%), and garden tractors produced numbered 181,400 (an increase of 18.5 times). (23). In 1957, garden tractors included 42,000 machines designed for use by a walking operator, of which 6,000 were under 2 H.P. and 33,000 were from 2 to 6 H.P. So-called motorized cultivators represented a large share of these, 75,000 of them having been produced in 1954, and 130,000 in 1957. 20% of the total number produced were under 2 H.P. in power. The high labor productivity in field crop cultivation in the USA, accompanied by the relatively small sizes of the farms as compared with the scale of socialist agricultural enterprises, is explained to no small degree by mass introduction of these small and maneuverable machines, which are widely used for mechanization of the most varied kinds of operations.

A characteristic tendency in the development of agricultural machinery manufacture is the accelerated development of the production of mechanisms for the application of chemicals to agriculture, as well as of hay and grass harvesters. Whereas the volume of production of all agricultural machines rose 520% in value from 1929 to 1956, the output of dusters and sprayers rose 12.2 times, that of haying machines 8.5 times, and that of lawn mowers 8.3. (24)

There is a rapid increase in the mass production of machines for the mechanization of labor in livestock farming, and of equipment for barns and chicken coops. In addition to pumps, milking machines, separators, butter churns, etc., special loading and transfer equipment is being produced for farming. Specialized production of chicken raising equipment for the market has taken on a mass character.

Finally, note should be taken of the increase in the production of threshers, corn shuckers with mechanical drive, silage cutters and silage loaders, corn huskers and feed mixers, various types of classifying machinery, dryers, etc. Whereas the total value of agricultural machinery

produced in 1956 was about a billion dollars, 120 million dollars worth of parts and spare parts were produced. With a total volume of tractor manufacturing in 1956 valued at 980 million dollars, the sale of spare parts was 400 million dollars. (25) This very large scale production of spare parts and parts leads to a considerable reduction in expenditures upon overhaul and operations.

The dynamics of the size of industrial enterprises is of considerable interest. Detailed data on this question is available only in the Industrial Census of 1947 and that of 1954. These data are gathered in the following tables:

	1947	1954
Number of enterprises in manufacturing industry	240,881	267,263
Workers therein, thousands	11,916.2	12,215.8
Average number of workers per enterprise	49.5	45.7
Including:		
Number of enterprises with 1-4 workers	70,384	95,434
Number of workers therein (thousands)	139.9	183.4
Number of enterprises with 5 or more workers	170,497	171,829
Number of workers therein (thousands)	11,776.3	12,032.4
Average number of workers in enterprises with more than 5 workers	69.1	70.0

The increase of 26,400 in the total number of industrial enterprises occurred entirely in the smallest type of handicraft-type enterprises with four workers or less. In the comparable group of branches of industry, the number of such enterprises rose from 70,400 in 1947 to 95,000 in 1954, or in other words by 25,000. The increase in the very smallest enterprises rose from 70,400 in 1947 to 95,000 in 1954, or in other words by 25,000. The increase in the very

smallest enterprises occurred chiefly in the woodworking and furniture industries (8,200 more enterprises). There was an increase of 3,000 in the number of enterprises making metal products (chiefly building parts, fasteners, as well as special-order metal-covering work). In the machinery-manufacturing industry, small enterprises increased by 6,000. These are enterprises manufacturing tools, jigs and other fixtures for metal-working equipment as well as small workshops (almost 8,700) manufacturing auto parts: pistons, piston rings, valves, bushings, carburetors, etc. The industries we have discussed account for 17,200 of the 25,000 new small enterprises with 1-4 workers. If we exclude the smallest enterprises, the average number of workers per enterprise with 5 or more workers underwent virtually no increase from 1947 to 1954 (rising from 69.1 to 70 people per enterprise).

The fact that the number of enterprises with 5 or more workers showed virtually no increase for manufacturing industry as a whole, and that their average size (in number of workers) remained the same, is a result of two opposing properties. In a number of branches of industry (foodstuffs, tobacco, textiles, clothing, woodworking and leather) the number of workers diminished considerably (by 10,000) and the average size of the enterprise rose correspondingly. An opposing tendency is to be noted in the metals industry (including iron and steel), in paper and paper-pulp, rubber furniture and other branches. In these branches, there is a considerable increase in the number of branches and in average size. On the whole, the number of enterprises in this group employing 5 or more workers increased by 11,400 from 1947 to 1954.

Let us examine these tendencies in greater detail, for the group of metal working branches of industry. (See table shown below.)

The reduction in the number of workers per enterprise is in itself no sign of reduction in the scale of the enterprises or of a decentralization of production. As already noted, mechanization and automation have, in view of the slow rate of growth in the volume of production in American industry, resulted in an absolute reduction in the number of workers during the past decade.

However, the considerable increase in the number of enterprises (by more than 8,000 in seven years) does bear witness to tendencies to decentralization and a reduction in

	Enterprises with 5 or more workers						
	1947			1954			Increase in the number of enterprises
	Number of enterprises	Number of workers therein (thousands)	Average number of workers per enterprise	Number of enterprises	Number of workers therein (thousands)	Average number of workers per enterprise	
Manufacture of metal products	12,022	812.5	67.6	14,811	805.7	54.4	2,789
Manufacture of machinery (except electrical and transport)	12,813	1,233.2	96.2	15,978	1,521.6	72.1	3,165
Electrical equipment and machinery manufacture	3,235	637.5	197.0	4,309	719.7	167.0	1,074
Transport equipment manufacture	2,820	985.3	349.4	3,722	1,323.8	355.7	902
Total in machinery manufacture	18,868	2,856.0	151.1	24,009	3,196.1	133.1	5,141
Tool and precision machinery manufacture	1,764	180.2	102.1	1,944	193.4	99.5	180
Total	32,654	3,848.7	117.9	40,764	4,195.2	103.0	8,110

scale of enterprises in the American metal-working industry. When we speak of decentralization of enterprises, we are speaking of the organization and technological aspects of the matter. The industrial concerns and firms stem from the establishment of small enterprises and the breaking up of a number of large enterprises into smaller units to be economically efficient. This does not in any way affect the concentration of property, as the small enterprises belong either directly to the same large trusts and companies, or are controlled by the latter. Inasmuch as the purpose of the present article is an analysis of the engineering and economic tendencies in the development of American industry, we deem it necessary to emphasize these tendencies towards managerial-and-technological decentralization. They are, to a considerable degree, to automation and the specialization of production.

The categories provided in the Census of 1954 covering

United States manufacturing industry envisage a grouping of enterprises by level of specialization. We have employed data of this grouping to calculate over-all data for more than 14,000 enterprises in the machinery manufacturing industry (not counting electrical equipment and transport equipment). These data embrace 14,300 enterprises with 747,000 workers, and a gross output of \$13,800,000,000. The grouping shows that as the level of specialization increases, the size of these enterprises diminished in terms of number of workers and value of output. However, despite the significantly smaller dimensions of the highly-specialized enterprises, labor productivity in these enterprises is not only not smaller, but even higher than that at large enterprises which are less specialized.

In this connection, a comparative analysis of the economic efficiency of enterprises of various sizes is deserving of attention.

Enterprises grouped by level of specialization	Number of enterprises	Number of workers therein (thousands)	Value added by manufacture (millions of dollars)	Total production in sales price (millions of dollars)	Average per enterprise			Production per worker (dollars)	
					Produced per worker (in dollars)	In terms of value added by manufacture	In terms of total production as measured in sales price	In terms of value added by manufacture	In terms of total production, sales price
All enterprises	14,292	746.9	8,084.2	13,792.8	52.3	565.6	965.1	10,823	18,466
Of which, with the following level of specialization									
90% and more	10,515	405.1	4,383.4	7,651.4	38.5	416.9	727.7	10,820	18,887
75-89%	1,046	107.8	1,176.7	1,954.6	103.1	1,125.0	1,868.6	10,914	18,129
50-74%	1,613	179.2	1,956.8	3,275.2	111.1	1,213.1	2,030.5	10,918	18,274

For all branches of basic machinery manufacture (excluding electrical equipment, transport, refrigerators, and machine parts), we have calculated the total value of production as measured in actual sales prices by groups of enterprises. On this basis, we have calculated the production per worker both on the basis of value added in manufacture, and on the basis of the gross value of the product. In addition, we have calculated, for all machinery

manufacture, the indices of power consumption per worker and per millions of dollars added by manufacture. It may be considered that difference in power consumption per worker and per million of dollars of production volume reflect to some degree the comparative level of equipment of the enterprise. These data have been compiled in the following table:

Enterprises grouped by number of workers employed	All machinery building (including electrical and transport)		Production per worker per year in terms of value added in manufacture (in dollars)	Production per worker per year per gross value of products (thousands of dollars) (26)
	Electric power consumption per year			
	Per worker (in KWH)	Per million dollars value added in manu- facture (in thou- sands KWH)		
Average of all enterprises	7,907	756	10,450	18,600
Of which, per groups of enterprises with following numbers of workers:				
5-9	3,680	428	8,600	14,750
10-19	3,840	445	8,650	14,700
20-49	3,540	392	9,020	15,700
50-99	4,520	470	9,650	17,900
100-249	5,270	522	10,100	19,400
250-499	7,400	727	10,200	19,600
500-999	8,900	855	10,400	19,400
1,000-2,499	8,750	790	11,050	19,500
2,500 and more	8,690	807	10,730	17,800

The table shows that the level of equipment available to small enterprises, as indicated by the indices for electric power consumption, is lower by a factor of 1.8-2.4 than that of the largest enterprises, and by a factor of 1.8-2.15 than the average for all enterprises. However, despite the significant differences in the level of equipment, labor productivity at the smallest enterprises is only very slightly less than at the largest. Output per worker in terms of value added in manufacture at enterprises with five to nine workers is 20% lower than that at the very largest enterprises (with 2,500 or more workers), while at enterprises employing 10 to 19 workers productivity is 19.5% lower than in the largest. In enterprises employing 20 to 49 the differential is 16%, and in enterprises employing 50 to 99 it is 10%. When measured in terms of gross value per worker, productivity at the smallest and next to the smallest enterprises (with 5 to 9 workers) is 17% smaller than at the greatest, whereas the differential is 17.5% when one considers enterprises employing 10 to 19, and 11.5% at enterprises employing 20 to 49. At enterprises with 50 to 99 workers the average annual output per worker is \$100 greater than at enterprises employing 2,500 and more. The maximum level of labor productivity is that at enterprises with 250 to 499 workers, where it is 10% higher than at enterprises with 2,500 and more workers.

The calculations presented yield some data for further elaboration of the problems of the economic efficiency of production relative to scale of enterprise under today's conditions of specialization and the development of automation.

The tendencies of development of American industry during the past decade described in the present review deserve the attention of Soviet economists and industrial personnel. A critical analysis of these tendencies will facilitate an investigation of the most efficient directions to be pursued for purposes of technological progress in Soviet industry, and for development of the directions to be followed to bring about the most rapid solution of the fundamental economic problem of the USSR.

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(3) Up to 1953, the indices of physical volume of industrial production were calculated by the so-called Board of Governors of the Federal Reserve System with 1935-1939 as the base. Subsequently, American officials converted to the calculation of indices with 1947-1949 as the base. Inasmuch as the former indices continue only to 1953, we have used 1947 as a transition year, and have extended the present indices to 1929. Thus, the rates of increase in production from 1929 to 1947 are given by the dynamics of the former index (1935-1939 = 100), and from 1947 to 1958 on the basis of the data on the present index period. The indices for 1929-1953 respecting certain branches are published in a summary form. The textile industry was combined with the clothing industry, the forestry and woodworking with the furniture, the iron and steel with the production of metal products, the machine building with the production of electrical machinery. The tool industry is not identified at all. We have broken down these combined divisions,

utilizing the data on the ratios between the rate of increase in what is conventionally described as pure product in these branches (in the terminology of American statistics this is called value added in manufacture) for 1929, 1939 and 1947. The indices for 1929-1953 in metallurgy were published independently for the iron and steel industry, on the one hand, and for the non-ferrous simultaneously, on the other hand, whereas for 1947-1957 they covered metallurgy as a whole. We have weighted the indices for 1929-1939, and 1947 by the shares of the iron-and-steel and the non-ferrous metal industries in the value added by manufacture in metallurgy as a whole, and thus obtained an index for the volume of production in the iron-and-steel and non-ferrous metal industries for 1929. All the industries are recalculated with 1929 as the base.

(4) The Handbook of Basic Economic Statistics, January 15, 1959, pp. 118-137.

(5) Until 1957 bituminous coal, which represents 90% of all coal output in the USA.

(6) Up to 1951, the so-called "old series" index shown here (1926=100) was published. Since 1947, a new index (1947-1949=100) has been published. We have utilized 1947 as a transition point, and therefore the figures here are an extension of previous indexes, up to 1958, using the 1926 base.

(7) Statistical Abstract of the United States, Washington, 1958, p. 529.

(8) Ibid., p. 536. American pounds are here recalculated as grams.

(9) Ibid., p. 529.

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(21) Statistical Abstract of the United States, 1957, p. 527.

(22) It should be borne in mind that motors under 1/100th H P. capacity includes tiny motors for toys, auto heaters and home appliances. It is not possible to identify the num-

(Continued on Page 96)

NOTES AND COMMUNICATIONS

I. Artemov, N. Vasilyev:

Possibilities for Improvement and Reduction of Cost of the Managerial Personnel

If the magnificent objectives for the development of the national economy and culture advanced at the 21st Congress of the CPSU are to be brought to reality, this requires a further improvement of and a reduction in the cost of the apparatus of administration.

The reorganization of the management of industry and construction carried out in 1957 made possible a sharp improvement in the management of the economy and, along with this, a reduction in the numbers of the managerial personnel, increasing the percentage of workers engaged directly in production. Whereas in 1941, there was one member of the administrative and managerial apparatus for every six workers and office workers engaged in the national economy, in 1954 this ratio was one to seven and in 1958 it was one to ten.

From 1953 to 1958, the number of managerial personnel diminished by more than 500,000. However, the percentage of managerial personnel not engaged directly in production is still exceedingly large relative to the total labor resources of the country. As has been noted in the resolutions of the 21st Congress of the CPSU, tremendous possibilities were available for further reduction and simplification of the managerial personnel of the governmental, business and other organizations.

Significant reserves of labor are available in the managerial apparatus of industry, where 20% of the total administrative and managerial personnel are engaged. In some economic administrative districts there is a multiple-stage system of management of the actual enterprises through trusts, bureaus and other business institutions. This results in unproductive expenditures and complicates the management of management. More than 4 billion rubles was expended on these organizations in 1957.

In the Ryazan Economic Council, only 27% of all the industrial enterprises were directly subordinate to the departmental bureaus of the economic council. The rest of the enterprises were managed through trusts. At the same time in the Vladimir Economic Council, where the number of enterprises is the same, but the number of workers and office workers employed therein is substantially greater than in the Ryazan Economic Council, the enterprises are managed directly by the departmental bureaus, and this substantially reduces expenditures on the maintenance of the managerial apparatus.

In the Orel Economic Council, less than 10% of all the enterprises are directly under the departmental bureaus, and the management of the rest is carried on through trusts (the meat industry trust, the dairy industry trust, the hemp trust). Here, there is an average of 11 personnel in the offices of the economic council and its trusts per thousand persons working in the enterprises themselves. However, in the Ryansk Economic Council, where the enterprises are subordinate directly to the departmental bureaus there are 11 members of the economic council staff for each thousand

personnel.

The following data on the number of personnel in the economic council machinery, their departmental bureaus, and the trusts, offices and other organizations subordinated thereto bear witness to the excessive size of the staffs of some economic councils, due chiefly to the existence of unnecessary intermediate stages of administration. On the whole, for every thousand workers and office workers engaged in the enterprises, there are about six people in the economic council, departmental bureaus and other business association offices, whereas in the economic council embracing the Turkmenian Soviet Socialist Republic there are more than 12 members of the staffs of the economic council and other stages of administration per thousand workers, 13 in the Stavropol Economic Council, 10 in the Estonian, etc. At the same time, there are economic councils such as the Altai and the Belorussian in which there are five administrative personnel for every thousand workers in production.

Excessive administrative staffs, and complex and multi-staged administration may also be witnessed at many industrial enterprises. For example, at the Moscow Machinery Repair Plant of the Hydromechanization Trust, there is one engineering or technological worker or office worker for every three or four workers. The management of the factory is broken down into very small units. The enterprise includes such managerial posts as assistant manager, and has planning and production departments, whereas other similar enterprises have no assistant manager, and have a combined planning and production department.

At the Moscow small-cylinder automobile plants, there is a single building housing two departments: the forging and machining department, and the tool department, each of which has its chiefs, assistant chiefs, and shop chiefs. Atop these two departments is a superstructure called the management of the tool and forging building headed by a chief and an assistant to him.

There are many enterprises where the size of the managerial staff continues to grow. At the Moscow Type Casting Plant No. 2, the number of managerial workers rose by 12% in 1958 over 1957, whereas the number of workers rose by less than 1%. A similar situation may be seen at the Moscow Autogenous Welding Plant No. 1, where the number of workers in the managerial apparatus increased by 16 in 1958, while the number of producing workers remained the same. At the Moscow Moskabel Plant, the number of purchasing and sales personnel rose by 16% between 1955 and 1958, and the number of production workers rose by 8.5%.

In many fields of industry, technological progress directly tends to increase the percentage of engineering and technological personnel in the total number of people employed. However, the figures presented above do not at all reflect these progressive tendencies, which relate to the introduction of the very latest in technology and the perfection of the organization of production. In many cases, the managerial apparatus is increasing in such categories as purchasing and sales, accounting, the administrative personnel directly under the management of the factory, etc.

At the present time, the USSR has about 1,600,000 people engaged in accounting and bookkeeping. Despite the reduction in managerial personnel and the measures taken to simplify bookkeeping, statistical and financial reporting,

the number of workers in this category of personnel has not only not diminished in recent years but has even increased somewhat. In 1955, the total number of bookkeepers, calculators, accountants, tabulators, registrars, order takers, cashiers, statisticians and personnel of computing offices totalled 1,580,000 for the country as a whole, whereas in 1958 they totalled 1,650,000, or 30% of the entire administrative and managerial personnel. More than one half of all office workers at industrial enterprises are engaged in bookkeeping and accounting.

The volume of bookkeeping work to be done depends upon a number of factors. Of greatest significance is the total number of workers and office workers engaged at the enterprise, inasmuch as the bulk of the bookkeeping and accounting personnel are engaged in calculations and analyses having to do with wages. Within a single branch of industry, with a single system of accounting and a single accounting plan, there should be approximately equal numbers of workers at the various enterprises relative to each bookkeeping or accounting person. However, this is far from being the case in reality. For example, at the Zaporozhstal plant, the average number of workers and office workers per bookkeeping and accounting person is 40% higher than at the Dneprospetsstal plant. These figures indicate that there is considerable room for economies.

One of the major causes for excessively large staffs of bookkeeping and accounting personnel is the inadequate mechanization of calculation and accounting. There are some enterprises where calculating machines are not used fully, and even where machine computation centers do exist, a considerable portion of the calculation and computation is done by hand. In the Moscow regional economic council, for example, only 27% of the industrial enterprises are served by machine calculation installations.

The all-round mechanization of accounting and calculating and, in the first place, that of the most time-consuming aspects of bookkeeping — keeping accounts of earnings and output, of materials of value, and of finished production — and the compilation of the turnover ledger is the foundation of reduction of expenditures on the maintenance of bookkeeping and accounting personnel. For example, it has been calculated that if even 50% of the enterprises of the Leningrad Economic Council were converted to mechanized accounting and the introduction of modern methods of accounting, this would make it possible to reduce the staffs of calculating personnel by 4,000. From 1959 to 1965, this would yield an annual saving of about 70 million rubles.

Many enterprises employ clumsy methods of accounting, complex forms of primary technological, economic planning and bookkeeping documents, and in a number of cases engage in the calculation of various indices that are completely unnecessary. Thus, for example, daily calculations are made of standards of wages and output per worker. Bulky accounting is done of indices of cost accounting on departmental and shop bases. Gross production is planned and kept record of by departments and shops, etc. However, these data are made virtually no use of in practice. The calculation of and accounting of wages are particularly confused. At many enterprises, piecework is employed in departments where this is unnecessary, quotas and rates are classified with excessive detail, etc. All this creates extra work for the bookkeeping and accounting personnel.

Simplification of accounting forms, and of primary documentation by all possible means, and the introduction of simplified methods of accounting will permit a considerable number of computing personnel to be relieved of this work. Thus, the mere transfer of certain categories of workers from piece to time-plus-bonus payments at enterprises

under the Cotton Textiles Industry Bureau of the Moscow Regional Economic Council resulted in cutting the administrative staff by more than 50 accounting personnel. The introduction of a simplified method of calculating fulfillment of the plan for gross production (without considering changes in incompleting production) reduced the labor by calculating personnel and also increased the reliability of the data in these reports.

Bookkeeping is today excessively decentralized in our economy. Every organization and each enterprise has its own bookkeeping and accounting personnel, even if the volume of work it does is small. The post of bookkeeper is provided for in orphanages, hospitals, technical high schools, small commercial enterprises and eating places, etc. In industrial enterprises too, accounting is often done on a decentralized basis — by departments, and sometimes even by divisions therein. For example, about 100 enterprises under the Moscow Regional Economic Council perform decentralized accounting of wages. Concentration of accounting in the central bookkeeping office of the enterprises would permit a more rational utilization of the work of the bookkeeping personnel, extensive introduction of mechanization and simplified methods of accounting, and would thereby reduce the numbers of administrative personnel. At the Odessa Press Plant, where all accounting and bookkeeping is centered in the main bookkeeping office, the number of workers and office workers per bookkeeping department worker is 110% greater than at another Odessa machine tool manufacturing plant, the 16th Party Congress Plant, where accounting and bookkeeping personnel are decentralized by divisions. At the Kolomna Heavy Machine Tool Plant accounting is centralized, whereas at the Mytishchy Machinery Manufacturing Plant it is decentralized. At the former plant, there are 76 workers and office workers per bookkeeping or accounting person, and at the latter there are 51. These data testify to the desirability of centralization of bookkeeping work at the enterprises.

Among the measures that could be taken to do away with excesses in the staffs of accounting and bookkeeping personnel would also be the creation of centralized bookkeeping offices under the bureaus and trusts of the economic councils and other high-ranking bodies, to serve small enterprises and institutions.

Problems of improving skills of accounting personnel deserve serious attention. The scale on which skilled accounting personnel is being trained does not correspond to the needs of the economy. Suffice it to say that, for example, that only 1% of the bookkeeping and accounting personnel at the enterprises and the offices under the Leningrad Economic Council have higher education.

The introduction of progressive methods of accounting, the mechanization of computation and calculation, an increase in the role of accounting in the administration of production, and improvement of accounting machinery requires that accounting and bookkeeping personnel have greater skill. Complex computing mechanisms are being introduced to replace the abacus and the calculating machine. The accounting worker must be well acquainted with the technological and manufacturing problems of his enterprise, and be able to make efficient use of complex computer equipment.

Under the circumstances of all-round mechanization of accounting and calculating operations, the need for mechanical calculating operations is eliminated. The bookkeeper's work comes increasingly to deal with analytical investigation of technological and economic conditions and the results of production, and the seeking out of resources for

improving the economic indices of the work of his enterprise. The increased role of accounting in the management of production and the increase in the skills of bookkeeping personnel require that order be brought into the system of enterprises for this category of people.

There is a considerable number of persons engaged in municipal and housing institutions, in medical and children's institutions, and in educational institutions and the like which subordinate to enterprises and other organizations. For example, at the Zaporozhstal plant and the Zaporozhe Ferroalloys Plant, such personnel constitute about 8% of the total personnel of these enterprises. As we know, most enterprises manage the housing occupied by their personnel. The major factories have an extensive system of service institutions, concern themselves with problems of urban improvement and even with the operation of the urban passenger transport system. In many cities the local governments have control of only about a quarter of the housing, the rest being in the hands of various enterprises and bureaus. This results in excessive housing staffs. In small housing bureaus, five times as many office personnel are required per 10,000 square meters of dwelling floor space as in large ones.

The same may be said of children's and medical institutions. A considerable number of them are split up under various bureaus. The absence of a unified administration leads to excessive expenses for the maintenance of managerial personnel. At the Zaporozhstal plant, for example, the factory administration has a special department of children's institutions. The fact that children's institutions are subordinated to various departmental agencies creates great inconveniences for the factory personnel living in districts distant from those where the kindergartens and day nurseries controlled by their plants are located.

The creation of social and cultural, and housing and service institutions attached to industrial enterprises was conceived, when this was instituted, by the need to establish permanent staffs at industrial enterprises and also by the shortcomings in the housing and social-and-cultural services to the population by the offices and enterprises under local government, the educational and public health agencies. Today, these factors are losing their significance. The question as to whether the housing and civic service institutions should be transferred completely to the local governments, and the social and cultural institutions to the public health and education authorities for purposes of reducing managerial personnel and improving the servicing to the working people, has now come to a head.

Industry possesses significant resources for simplifying departmental management. The engineering and technical personnel and office workers of their subsidiary departments constitute 55% to 60% of the total number of such persons at enterprises in the machinery building and machine tool manufacturing industries, whereas in the iron and steel industry this percentage is 65 to 70. At many enterprises there are shops and departments that are diminutive in size. This pertains chiefly to auxiliary and service departments. For example, at the Dnepropetrovsk plant manufacturing medium-sized hydraulic and heavy mechanical presses, virtually every technical group is organized as an independent department, with the result that auxiliary departments constitute more than half the total number of departments. In the nature of its products, this plant is analogous to the Odessa Press Works, yet the latter has only 40% as many departments as the former.

The structure of management in many departments is set on a multiple-stage basis and is similar to the structure of the factory management. Thus, in the boiler repair

department of the Zaporozhstal plant, which has a little more than 100 workers, until recently there was a technological bureau, a bureau of technical standards, a planning and distributing bureau, and a general office, each headed by an administrator. The administrative apparatus of each such department also included a chief of department, two assistants to him, foremen and timekeepers.

A major shortcoming is the absence of a unified standard managerial structure for departments at enterprises in the various branches of industry. The number and structure of departmental personnel is determined on an individual basis at each factory. The cold rolling departments at the Zaporozhstal plant and the rolling departments of the Dneprospetsstal plant are virtually identical as to the nature of production and the number of workers; nevertheless, the departmental managerial personnel at the Dneprospetsstal plant is 7.5% of the number of production workers, whereas at the Zaporozhstal plant it is 4.7%. There are five assistant and vice-chiefs of departments in the rolling department at the Dneprospetsstal plant (including an assistant in charge of supply, while the factory management itself has a supply department with 16 people in it), whereas at the Zaporozhstal plant only 2 people are listed as assistant and vice-chief.

It seems desirable that we elaborate a standard structure and number of persons to be engaged in managerial work of similar departments within each branch of industry. This will help us to straighten out the structure and number of departmental personnel.

Practice has shown that when the structure of administration at enterprises is not broken down by departments, the administrative personnel within each department is considerably smaller and the guidance to production is actually improved. The elimination of unnecessary stages in administration makes it possible to bring management close to production, to increase the flexibility of management, to make rational use of the labor of engineering and technological personnel and office workers and to save large sums of money and quantities of material. The organization of management without departmental breakdown has achieved wide recognition. It is necessary to continue spreading this into small and medium-sized enterprises. At large enterprises, where it is undesirable to eliminate the management of the individual departments, we should take advantage of possibilities for combining and enlarging the smaller departments. Such possibilities exist at virtually every plant.

An increase in department size yields a noticeable economy. At one plant in Moscow, for example, the result of the combination of small departments was to cut the total number from 12 in 1954 to 6 at the present time. Despite the substantial increase in volume of actual output, the number of departmental personnel has remained at the same as in 1946.

Major extravagances in managerial personnel also exist in the construction industry. There are many economic administrative districts where small construction organizations continue to exist. In Tambov, in addition to 11 construction organizations subordinate to the economic council and to the Construction Ministry of the RSFSR, various bureaus have building organizations that do negligible volumes of work.

The structure and staffs of the administrative apparatus of construction organizations are governed by eight different standard personnel lists set up in 1946-1955 for various ministries. These ministries have been abolished, but the problem of the tables of organization inherited from them has not yet been solved.

Combination of construction organizations and the transfer of construction organizations from ministries and bureaus not concerned with construction, and from control by local governments, to the regional economic councils and the construction ministries, as well as a re-examination and coordination of the standard tables of organization, are the major directions through which it is possible to attain a reduction of the number of the administrative personnel and of administrative and managerial expenditures in construction.

Nor have all possibilities for reduction of staff and of expenses in the managerial agencies of locally-controlled industry been exhausted. In many oblasts of the RSFSR, the management of industry under local government is performed through bureaus for the respective industries, which frequently manage only a handful of tiny enterprises. Thus, in Astrakhan Oblast the following bureaus exist to manage 55 small enterprises: the local industry bureau, the fuel industry bureau, the construction materials industry bureau, and the foodstuffs industry bureau. In our opinion, these oblasts and krais having an insignificant volume of locally-subordinated industry should combine these departments for the various industries into single local-industry bureaus.

The 21st Congress of the Communist Party of the Soviet Union emphasized that the carrying out of measures to simplify the structure of the managerial system in the national capital and the various localities would make it possible to render this system more flexible, skilled and economical. Economy of funds resulting from improvement of management, elimination of unnecessary stages, combination of departments, subdepartments, and conversion of enterprises to systems of management bypassing departmental structure will facilitate the fulfillment of the problems posed by the Communist Party for the further upsurge of the socialist economy and improvement of the living standard of the Soviet people.

F. Savenkov:

Some Problems Relating to Reduction of Expenses Connected with the Agricultural Purchase Program

At the December, 1958, Plenum of the CC of the CPSU attention was drawn to the need to improve the system of agricultural purchases. An important role in carrying out this objective should be played by a reduction in the expenses of the purchasing organizations in their purchases of agricultural produce and raw materials. Large funds are absorbed in the processing of agriculture products and industrial enterprises, and the costs of turnover by purchasing organizations are still high. The general expenditures connected with purchasing attain 30 and more percent of the cost of certain products and raw materials. For example, in 1958, the expenditures in the Bashkir ASSR related to procurement and purchasing of eggs came to approximately 31% of their value and in a number of rayon consumers' cooperatives of Smolensk Oblast this figure was 28%. The expenses of procurement organizations are large because their tables of organization are inflated. Often, the maintenance of these organizations costs the government almost as much as the produce that they procure. Thus, the Voronezh Oblast bureau of agriculture has three inter-rayon offices for the procurement of silk cocoons. Their staffs total 23 persons with an annual wage bill of

175,000 rubles. Last year, these offices procured 16 tons of cocoons to a total value of 422,000 rubles.

Despite the measures taken in the last few years to reduce the procurement staffs and to bring some order into the activities of procurement organizations, these shortcomings have as yet not been outlived and the examples cited above are not exceptions.

On a nationwide scale, expenses related to procurement, receipt and storage of agricultural produce and raw materials come to more than 5 billion rubles per year. Therefore, the methods of procurement must be improved. This will make possible a further reduction in the procurement staffs and a significant financial economy. The most important matters at issue are the successful fulfillment and overfulfillment of the annual plans for the purchase of all types of agricultural produce, the establishment of direct ties between the producers (the state farms and collective farms) and the consumers (the processing and trading organizations), and the organization of state-farm, collective-farm and intercollective-farm enterprises to process agricultural produce and raw materials.

About a million people are currently engaged in procurement, purchasing, receiving and warehousing. However, a considerable number of these could without any question be transferred directly to agricultural production. In each rural district there are no less than five organizations engaged in the procurement and purchasing of agricultural products and raw materials, with a total staff of 160 persons, and there are more than 8 purchasing agents on the average for each collective and state farm in the country. In addition to the enterprises in the meat processing industry within the systems belonging to the regional economic councils and governments, meat purchase is often carried on parallel to these by consumer and industrial cooperatives, Departments of Workers' Supply, restaurant organizations, markets, etc.

What has to be done in order to reduce the staffs engaged in procurement, to cut costs there, to simplify the table of organization, and to make it more flexible?

There are two points of view in this connection. One of them boils down to the creation of a single procurement (purchasing) organization in the rural districts subordinate to the consumer cooperatives, to which the functions of procurement and purchasing of agricultural products and raw materials would be transferred. This would make it possible to abolish the numerous procurement organizations and thus sharply to reduce the bloated procurement system and to cut costs of circulation. However, in our opinion, this can hardly be deemed the most efficient procedure. Cooperatives, were they to become monopolists in the field of procurement, would continue to be an intermediate transmitting link between agricultural production on the one hand and industry and commerce on the other.

It would seem to us that another point of view would be more correct: completely to eliminate the procurement organizations as intermediaries, and to arrange for agricultural products and raw materials to move directly from the producers (state farms, collective farms, by-product and other farms) to the consumers (processing enterprises or merchandizing organizations).

Experience shows that the tremendous majority of the various procurement organizations (agents, representatives, inspectors, bookkeepers and other personnel) are engaged actually in servicing private individuals who constitute sources of such raw products: collective farmers, workers and office workers engaging in agriculture on the side. The receipt of raw materials and produce purchased from the state farms, the collective farms and the industry-

ed farms occupies only a small number of people at the enterprises and the market centers, with no special procurement apparatus required.

As we know, a joint resolution of the party and the government, dated January 1, 1958, has eliminated compulsory deliveries to the State of all agricultural products by the individual collective farms, the members of industrial and every cooperatives, invalids' cooperatives and workers' office workers engaged in farming on the side. In order to assist collective farms in the sale of their surplus farm produce and raw materials, it has been recommended that collective farms accept this produce and deliver it to receiving stations. This makes it even more necessary that steps be taken to reduce the bulky and expensive procurement apparatus.

Experience shows that the new system of procurement is completely justified itself. Thus, as far back as 1957, the Voronezh Oblast Committee of the Communist Party and the Oblast government took the initiative to arrange contacts between dairies and collective farms for the organized receipt of milk from the collective farmers, and from workers and office workers engaged in farming on the side, for delivery of this milk to the plants. As a result, milk purchases increased by nearly 10% in only 20 rayons, the number of purchasing agents was cut by 70% and this resulted in a reduction of total procurement costs by half. The purchase of milk from collective farmers by their collective farms in the Zhitomir, Odessa, and Khmel'nitsky Oblasts, in Krasnodar Kray and the Moldavian and Georgian Republics proved equally efficient.

However, there are many rayons in which the organization of milk purchasing without procurement personnel as intermediaries is being delayed. Yet we know that when milk is purchased through collecting agents its cost increases. For example, the Plastun Dairy (Krasnodar Kray) paid about 2 rubles for each liter of milk purchased by agents. Therefore it is not surprising that the dairy had to pay 3 rubles 14 kopecks per liter of milk. In Golaya Pristaya rayon (Kherson Oblast), the cost of milk procured by agents is almost double that envisaged in the plan.

Another important measure is the sale of milk-separating enterprises which engage in the purchase and preliminary processing of milk to the collective and state farms. This would make for establishment of direct relationships between agricultural production and the enterprises in the butter and cheese industry and would eliminate the existence of intermediary purchasing organizations. Moreover, the butter and cheese industries, which would be freed from carrying out functions of procurement and primary processing of milk, would find themselves in a position to expand their capacities and greatly increase their output by the use of the funds thus saved. The economic councils of the Moldavian and the Azerbaidzhan Republics have already taken this step.

Work on the cream separator can be combined with work in other fields of production in the collective and state farms. We know, that as a general rule, the separator stations of dairies are currently not kept fully busy. Thus, the milk separator station of the Belgorod dairy was in operation during the following periods of time during the working day of last year: in March from 20 to 70 minutes per day, in June from 60 to 90 minutes per day. The maximum work load on the Strelets separator station on this day was four hours in June and two hours in November per day. The transfer of the separator and milk-receiving stations to the collective farms in Lithuania have resulted, for example, in a more efficient utilization of milk by-products from collective farm livestock, has increased the sense of

responsibility of farm managers and milkmaids and zoo-technicians as well as of collective farm chairmen for the produce delivered to them, and has improved the supply of fuel and ice to separator stations. All this has resulted in a sharp improvement in the quality and a reduction in the cost of milk production.

In some rayons, where the purchasing of milk from individual sellers has been properly organized, the transition is under way to purchasing of other farm produce through the collective farms without procurement agencies as intermediaries. Thus, in the Terengul rayon of Ulyanovsk Oblast, the collective farms are purchasing surplus cattle from collective farmers, workers and office workers in the name of the government. They then transfer them to meat packing plants. With the money received from the meat packing plants, the collective farms settle with the original suppliers. This cuts procurement costs by more than 20%.

It should be noted that the size of the staffs engaged, in the economic councils as well as the republic and local organizations, in the purchasing and the procurement of agricultural products and raw materials for enterprises in the food and light industries is still quite large — more than 300,000 persons. Yet only a third of this personnel is at the enterprises or the receiving stations, and two-thirds in purchasing offices, at bases, and in departments in the villages. Vast sums go to maintain them, and this increases the cost of agricultural products.

In our opinion, it would be desirable that purchases, procurement and the receipt of agricultural products be performed directly by the enterprises in the food industry, without intermediaries, and that the unnecessary purchasing organization be abolished. Under this situation, the sole purchaser of agricultural raw materials would be the consumer co-ops, and even there only in those rayons where there are no food industry enterprises. The procedure for purchasing raw materials for the textile industry should be approximately the same.

An important means for reduction of costs of circulation, and for cheapening agricultural products and reinforcing the economies of the collective farms is the building of collective farm, inter-collective farm, and inter-rayon enterprises for the processing of agricultural products and raw materials. A number of the collective farms of the Moldavian SSR have separator stations, oil presses, structures for the drying of fruits, mills, etc. These collective farms conclude contracts with enterprises in the food and milk and meat industries for sale of semi-processed produce and raw produce to them, and do without procurement organizations as intermediaries. Other republics have the same opportunities available to them. In the Luch Vostok collective farm of Iliy rayon of the Kazakh SSR, a cannery has been in existence for more than four years, during which time it has processed over 3,000 tons of vegetables. There are some collective farms in the Ukraine that also have their own plants.

A change in the system of procurement of the products raised in cotton farms is also of much significance. This change would envisage transferring to collective and state farms the work of cleaning and drying cotton and would create the necessary equipment and installations for this purpose in the next three to four years.

In the course of time, the collective and state farms will engage ever more fully in the primary processing of flax, hemp, bast fiber crops, fruits and vegetables.

A fundamental reorganization of the system of procurement and primary processing of silk cocoons is necessary. Currently this is done over a period of two or three

months, whereas the expenditures upon maintenance of the rayon silk industry bureaus and cocoon drying installations continue over the entire year. In our opinion, the primary processing of cocoons should be turned over to the collective farms, the object being for them to sell them directly to industries in the dry form.

Thus, today, all the conditions exist for abolishing the shortcomings involved in the procurement of agricultural produce, and to increase their quality and reduce costs.

E. Koretskaya:

The Development of Cost Accounting in the Collective Farms

The 21st Congress of the Communist Party of the Soviet Union has posed an historic objective before the working people of our country: to make, in the coming seven years, a major step in the direction of the solution of the basic economic task of the USSR and in the upbuilding of a communist society. An important role in the solution of these objectives is to be played by the collective farms. In the course of finding additional reserve capacities for the expansion of collective farm production, increasing labor productivity and reducing the cost of agricultural produce, and also in increasing the profitability of collective farm production, the collective farms are paying much attention to the development and organization of cost accounting.

Cost accounting is a form of the planned management of the business of socialist enterprises. Its functions involve financial comparisons of the costs and results of business activity, reimbursement of the outlays of individual enterprises from their own incomes, guaranteeing the profitability of production, and provision of material incentive and responsibility on the part of the enterprise and its personnel. Cost accounting is a socialist form of organization of material incentive to the working people for the fulfillment and overfulfillment of government plans, and for achievement of profitability of the operation.

The further progress of collective farm production requires the development of correct, scientifically valid, practical methods of accounting for the value of agricultural produce, and of planning and organization of circulating capital belonging to the collective farms, and reinforcement of the principle of cost accounting. Many collective farms have already proceeded to introduced brigade-wise cost accounting, included among them a number of collective farms of the Moscow, Yaroslavl, and Kostroma Oblasts, Stavropol Kray, etc.

The need to convert brigades and livestock subsidiaries of collective farms to cost accounting is prompted by a number of factors. The scale of the collective farms and, correspondingly, of the brigades, has sharply increased in recent years. Currently, some brigades are equivalent to former entire collective farms in terms of the amount of land assigned to them, and the equipment which they operate.

The increase in the volume of production and the territory over which collective farms conduct their operations, and the similar increase with respect to the brigades within the collective farms requires that the production units of the collective farms, brigades and livestock enterprises be given more independence in day-to-day operations with respect to solution of business problems. This, in turn, gives rise to the need for strengthening the material incentive in the results of the work of the brigade leader and of

all the collective farmers, primarily by converting the brigade to cost accounting. The new procedure for the planning of collective farm production, the introduction of a new, single scale of purchase prices, and the reorganization of the Machine and Tractor Stations have played a major role in the development of intra-collective farm cost accounting. The new planning procedure makes possible a more independent solution of problems of the planning of production and the geographic distribution of agricultural crops not only over the collective farm as a whole, but also within each individual brigade.

The transition to a unified, single system of purchase prices has facilitated accounting of produce and the costs of its production. The establishment of the new purchase prices makes it possible for each brigade, given correct organization of its labor force, to assure the profitability of production and consequently the gaining of a net income, a definite portion of which may then be distributed among the members of the brigade as an additional incentive.

The reorganization of the Machine and Tractor Stations and the introduction of the system of direct sale of equipment to the collective farms themselves means that the success of the farming operations in the collective farms today depends entirely upon these farms themselves, the initiative and activity of the brigade leader and of the entire team. When brigades and livestock units are placed on a cost accounting system, it becomes possible to increase the responsibility borne by all brigade leaders and the individual collective farmers for the fulfillment and overfulfillment of quantitative and qualitative indices in the plan for the production of agricultural produce by the collective farm, and for a more rational and economic utilization of the means of production (land, machinery, agricultural tools, fuel, electric power, seed, fertilizer, feed, etc.) and of labor (an economical utilization of the labor day). Cost accounting also facilitates realization of all-round mechanization of all production processes in collective farms, and an increase in the initiative of all the collective farmers in seeking new possibilities for increasing collective farm production and improving its profitability. It also permits determination of the profit resulting from the work of each team and livestock unit, as well as of each branch of production in the collective farm. The introduction of cost accounting into the brigade and the livestock unit will eliminate equalitarianism in payment for the labor of the collective farmers and will strengthen the socialist principle of distribution in accordance with labor contributed.

At the present time, the system of cost accounting on a brigade basis varies greatly from one collective farm to the next. This is explained, primarily, by the fact that cost accounting within the individual collective farms is only in its earliest stages.

The first stage of development of cost accounting within the brigade is characterized by permanent assignment of production to each field brigade, and by establishment of specific limits for all outlays of abstract and concrete labor (wear of agricultural machinery, tools and other equipment, expenditure of fuel, fertilizers, seeds, etc., workday outlays). The brigade leaders are granted a greater amount of independence for their economic operations. Along with other forms of material stimulus to the collective farms in the development of the collective portion of their activities an additional payment is instituted for saving of fuel, for increasing the service life of agricultural machinery, for economic outlays of workdays, etc.

A shortcoming of this form of cost accounting is the fact that the cost and profitability of agricultural produce is not

ulated on a brigade-wise basis. Moreover, with this form of cost accounting, an excessive number of indices are used to calculate material stimuli to the collective farmers in the development of the farm's collective undertakings. Typical of the second stage in the development of cost accounting on a brigade scale is a tendency on the part of the collective farms to introduce general indices instead of a large number of indices of material stimuli to the collective farmers for progress in collective-farm production. For example, in many collective farms of Kostroma Oblast, the allotting of workday units to collective farmers is performed on the basis of the work done, while the payment for the workday unit is made in accordance with the level of labor productivity actually attained brigade-wise. A brigade recording a higher labor productivity than that of the collective farm as a whole is paid relatively more for each workday unit it contributes. Should the planned productivity of labor not be reached, the payment per workday unit is diminished accordingly. The productivity of labor per brigade and per collective farm as a whole is determined on the basis of a system of equating labor output of various types of production to the labor outlay for the production of one centner of grain. The gross production per brigade is divided by the number of workday units expended. Each brigade has its own coefficient for equating all types of production to grain, and in arriving at this coefficient due consideration is given to the fact that the different brigades have different conditions of soil and climate and that the degree of mechanization of agricultural work may vary, and consequently the outlays of labor may also differ. In addition to this differentiation of payment of labor on a brigade scale, an additional payment is made for economy of fuel and for prolonging the service life of the major means of production.

In the collective farms of Yaroslavl Oblast (for example the "Rossiya" collective farm), intra-collective farm cost accounting is carried out in essentially the form that we have described, with certain differences. Here, too, an additional payment is made for overfulfillment of the plan in terms of gross output of each type of produce, but in addition, there is a general index for supplementary pay for saving money and material means entering into the costs of production of the brigade. If savings are accomplished in the utilization of purchased means of production, there is a corresponding increase in the cash payment for the workday unit, and for savings in the utilization of means of production produced in the farm itself, an increase in payment is made in kind, in the form of workday units.

Shortcomings in cost accounting at this stage of development include the fact that material stimulus to the collective farmers in advancing collective farm production is based on an excessive number of indices and also the fact that the complexity of the calculations which make it difficult for the collective farmers to understand the system. Under this form of cost accounting, no calculation of the cost of collective farm production by brigades and determination of the profitability of operation is performed. The third and most developed stage in the development of brigade-scale cost accounting to stimulate an increase in labor productivity and reduction in the costs of production of collective farm produce is cost accounting based on calculating the cost of the produce produced in the brigade, on giving due consideration to this index in paying for labor contributed by the collective farmers. Supplementary payment to members of the brigade for reduction in the cost of the brigade's produce is calculated annually, in accordance with economies in costs of production. To

determine the economy recorded by the brigade, the resultant produce is measured in terms both of the planned and the actual cost per unit of output. The difference between the planned and actual cost of production indicates the amount of saving or waste.

However, this form of brigade-scale cost accounting does not stimulate the members of the brigade to achieve an increase in the quality of the agricultural produce they produce. It does not provide measures to combat wastage, or the presentation of produce not ready for the market, nor is there stimulus for so important a factor in improving the profitability of collective farm production as price (the fact that the prices for early vegetables have been set by the government at a higher level than those for late vegetables). Finally, under this system of brigade-scale cost accounting, it is difficult to attain an idea of the level of profitability of operation of the various brigades and branches of industry.

This type of brigade-scale cost accounting is in use, for example, at the Vladimir Ilyich Collective Farm in Moscow Oblast. The collective farmers are credited with workday units in accordance with their fulfillment of quotas (based on the jobs done in crop raising, and based on yield in livestock farming), whereas bonus payments are based on fulfillment of the plan for cost of production. Simultaneously, a bonus payment is made for early vegetables, for milk production during the winter, and for the production of feed crops. Products not ready for use are not included in the gross production credited to the brigade. However, this type of brigade-scale cost accounting involves complex calculations.

The shortcomings of this last form of cost accounting are eliminated when a more complete form of brigade-scale cost accounting is used. The collective farmers' interest in increasing the productivity of labor and cutting the cost of production under this form of cost accounting is based, first, on crediting workday units to the collective farmers for performance of jobs in accordance with quotas, and to the brigade leaders for gross output. Secondly, the workday unit is credited differently for the different brigades in accordance with the fulfillment of the plan for net income. All these indices in the cost accounting plan are real and not conventional.

It should be noted that the basic principles of this form of brigade-scale cost accounting may also be applicable, after conversion to a more advanced form of payment for the labor of collective farmers, that is, upon introduction of monetary payment for labor in the collective farms. Let us examine this form of brigade-scale cost accounting in terms of the activity of the Lenin Collective Farm of Lenin rayon of Moscow Oblast, in which the payment to the collective farmers is based on the workday unit.

The Lenin Collective Farm of Lenin rayon in Moscow Oblast is a large, highly profitable enterprise engaging in many fields of agriculture. In 1958 its income was 8 million rubles. The collective farm has 1,940 hectares of land, including 929.6 hectares of cropland. It embraces 950 families and 1,238 members of the collective farm, of whom 1,122 are able-bodied. The collective farm includes three field brigades, one orchard brigade, and one brigade servicing hot frames and greenhouses. In addition, the collective farm has two cattle, three pig and one chicken-raising units. The collective farm possesses fourteen tractors, three harvester combines, fifteen trucks, 126 horses, 484 cattle (including 275 cows), 749 pigs and over 3,000 chickens.

In 1957, all the brigades and livestock units of the Lenin Collective Farm were placed on a cost accounting basis. Each brigade was given a plan for output, a cost-of-

production plan, and a plan for the value of the output the brigade is to yield. The production plan of the brigade includes the planned yield of produce, the sown acreage, and the yield per acre. The production plan forms the basis for the compilation of a plan for cost of production and the plan for the value of the produce to be yielded.

The labor-day unit outlays are determined on the basis of standards of production for each type of worker, approval by a general meeting of the collective farm, and are distributed in accordance with the various crops. Then, the total expenditures of labor-day units per brigade are established, and are estimated in accordance with the value of a labor-day unit as planned by the collective farm. For 1959, the cost of a labor-day unit in this collective farm was planned at 26 rubles, including 10 rubles in cash and 16 rubles in produce. The produce issued to the collective farmers in accordance with workday units is estimated in accordance with government retail prices, the idea being that the collective farmer may choose to accept money instead of produce.

The produce produced and consumed in the collective farm itself, seed for example, is evaluated on the basis of the actual average cost throughout the collective farm during the preceding year, whereas forage and fertilizer is estimated on the basis of the planned average cost of production thereof in the collective farm. Purchased seed and fertilizer and purchased forage are calculated on the planned cost of procurement. Expenditures having to do with the operation of the tractor fleet and the trucks, as well as expenditures for repairs, are calculated on the basis of the planned monetary expenditures for fuel, spare parts, etc., whereas wear of inventory is determined from the actual wear of the inventory in the possession of the brigade during the preceding year, and amortization of the fixed capital in the possession of the brigade is calculated on the rates of amortization applied in state farms. The resultant total of production expenditures represents the costs of production of the brigade and is not included in the expenditures on a collective farm-wide scale.

The plan for value of output for each brigade and farm has the purpose of determining, in the first place, the profitability of the operation of the brigade and the farm as a whole, and of each type of produce separately and, in the second place, realization of payment in accordance with labor depending upon the fulfillment of the net profit plan for each brigade and livestock unit, i.e., on the basis of the most generalized index.

The monetary estimation of each type of produce is made in accordance with various forms of distribution by the collective farm. Produce designed to be used in the seed reserves is evaluated on the basis of the average planned cost. Produce that is sold and produce designed for issuance to collective farmers in accordance with their labor-day totals is estimated on the basis of government purchase prices. In order to provide a material incentive to the collective farmers to produce quality farm produce and to reduce the percentage of waste produce, the price for produce in unsatisfactory condition is only a third or even less than the purchase price. At this price, the collective farm can acquire such produce and use it to feed cattle or for sale to another collective farm as feed. The monetary income and the costs of production of the brigade are used to determine the planned result of the brigade's operation: the profit or loss recorded. For example, the planned profit of field brigade No. 1 of the Lenin Collective Farm is calculated as 531,131 rubles for 1959.

In order to interest the brigade not only in the fulfillment of the plan for profitability of its output, but in overfulfilling

this plan by increasing the productivity of labor and reducing the costs of production, the crediting of labor-day units to the collective farmers in the field brigades of the Lenin farm is based on the standards for work performed approved by the collective farm as a whole, and for actual production in the case of collective farmers engaged in the livestock units. To increase the material incentive to workers in the field brigades for enlarging the gross production of field crops, the crediting of labor-day units to brigade and team leaders for leadership of the work of the brigade is based on the quantity of produce produced. For example, in 1959, the following standards for crediting labor-day units per ton of produce were set up for certain crops with respect to the payments to be made to brigade and team leaders of field brigades solely for their managerial activities. These standards can serve merely as examples, as far as other brigades are concerned, and should be rendered more precise in accordance with the natural and economic conditions existing there, and with the level of mechanization of farm production.

The crediting of labor-day units to brigade and team leaders engaged in field operations, and to livestock unit chiefs for purposes of making annual cash advances to them is calculated at 80% of the total of labor-day units they are planned to record. For example, if the brigade leader of field brigade No. 1 of the Lenin Collective Farm fulfills the plan of production for his brigade in 1959 for gross output, he will be credited with 637 labor-day units, or 53 labor-day units per month. In actuality, the brigade leader is credited 41 labor-day units per month. The remainder of the labor-day units are accredited and paid for at the end of the year in accordance with the actual gross production by his brigade. Rank-and-file collective farmers of the brigade and farm are credited in full for their monthly monetary advances, this being based on the standard of output quotas.

Crops	Labor-day crediting quotas	
	To brigade leaders	To team leaders
Late potatoes	0.15	0.15
Early potatoes	0.40	0.30
Late vegetables	0.05	0.10
Early vegetables	0.30	0.20
Late cucumbers	0.50	0.50
Early cucumbers	0.60	0.60
Tomatoes	0.30	0.50
Onions	1.00	0.60
Other vegetables	2.00	0.70
Feed beets	0.06	0.10
Grains	0.30	—
Silage corn	0.15	0.07
Corn to be fed green	0.03	—
Grain, clover, silage	0.03	—
Clover, silage, straw, etc.	0.30	0.20

The final value of the labor-day unit in the various brigades and livestock enterprises will vary in accordance with the fulfillment or overfulfillment of the cost accounting plan. It will be directly dependent upon an increase in the productivity of labor and reduction in the cost of production in each brigade and livestock unit. In order that the

uation of the labor-day unit per brigade and livestock enterprise be not influenced by factors not related to indices of the quality of the work done by the brigade (for example, price changes during the year), the produce of the brigade is calculated, when totals of fulfillment of the cost accounting plan is determined, in terms of the prices in which it was planned when the cash income of the brigade was set up. However, to determine the real profitability of operation of each brigade and livestock unit, the produce is to be evaluated in terms of the prices at which it is actually sold.

The cost of a labor-day unit for all members of the brigade or the livestock unit, including team leaders, brigade leaders and livestock unit chiefs, is ultimately determined at the end of the year on the basis of the fulfillment of the income planned for the brigade and the farm, or in other words in terms of its profit. If the brigade or farm achieved a profit equal to that which was planned for it, then a labor-day unit is also paid for on the basis of the planned estimate. If the brigade's plan for profit is overfulfilled or if it is underfulfilled, the payment per labor-day unit is correspondingly raised or lowered.

This procedure for distributing a portion of the net income of the collective farm places all the brigades and livestock units on an equal footing, as an increase in payment for the labor-day unit resulting from overfulfillment of the cost accounting plan, takes the form of supplementary distribution of a portion of the net income of the entire collective farm, and not of that of the particular brigade or livestock unit.

The fund out of which supplementary payments are made for overfulfillment of the cost accounting plan in each collective farm should have definite limits agreed upon in advance by the collective farm. Moreover, the distribution of net income should be carried out so as not to cause damage to realization of the plan of expansion of collective-farm production and the establishment of other public funds of the collective farm.

To improve the realism of cost accounting, a simple, but accurate and correct organization of calculation and monitoring of the real expenditures of labor, money and material funds in the collective farm is needed.

Cost accounting introduces certain changes into the organization of primary bookkeeping. Thus, in the Lenin Collective Farm, in the orders for accounting of labor-day units within each brigade, the team or brigade leader must indicate not only the type of work and the number of labor-day units credited to each collective farmer for its fulfillment, but also the crop for which these labor-day units were credited. Every ten days, these orders are given to the collective farm bookkeeping office. Each month, the bookkeeping office calculates the number of labor-day units expended upon each crop, brigade by brigade. In the future, the primary accounting in the collective farm will be so organized that the brigade leader will transmit to the bookkeeping office reports in which the results of the labor-day outlays by types of work and by crops will already have been totaled. The bookkeeping office maintains a labor ledger for each producing unit. The outlays of labor-day units per brigade are calculated simultaneously for each culture, for each type of work and for the periods required to carry them out. We present here the form used for potatoes (see following table).

The expenditures of labor by power equipment operators of the collective farm are entered into the tractor fleet, all outlays being subdivided by brigades, and by crops within each brigade. For each crop, the outlays are reckoned in terms of the type of work and month, on the basis of

lists turned in by the tractor accountant. These lists indicate the outlays of labor to be credited to each crop and each brigade. Accounting of labor outlay in the repair garage is carried out in the same fashion. The monetary outlays for operation of the tractor fleet and the trucks are distributed among the brigades in accordance with the outlays of labor-day units by the machinery operators of the collective farms and the automotive transport personnel, while within the brigades they are distributed crop-wise in accordance with these outlays. Wear of tools and amortization within the brigade are determined on the basis of standards established for state farms, and are calculated for the tools and machinery assigned permanently to this brigade.

Brigade number	
Labor-day units to be expended according to plan	
Actual outlay of labor-day units	

	Labor-days per month	Total labor days
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Period I, prior to planting:

- Preparation of organic fertilizers
- Haulage of organic fertilizers
- Yarovization
- Etc.

Total labor-day units expended during first period

Period II, planting:

- Potato haulage
- Replowing of fallow
- Cutting hills
- Etc.

Total labor-day outlay during second period

Period III, cultivation:

- Harrowing
- Irrigation
- Weeding
- Watchman services
- Additional fertilizing

Total labor-day outlays in third period

Period IV, harvest:

- Harvesting
- Crating
- Loading onto trucks
- Harrowing after harvest
- Grading of potatoes
- Plowing for fallow

Total outlay of labor-day units in fourth period

Total outlay of labor-day units for potatoes

One of the important questions in carrying out cost

accounting within the collective farm is the organization of bookkeeping for produce transmitted from one brigade to another (for example, seed material raised in the hot frames and made over to the field brigades, or feed made over to the livestock units of the collective farm). In the Lenin Collective Farm, such produce is evaluated in accordance with the average planned cost for the given year. This stimulates production of the given type of output at the lowest real expenditure, and this makes it possible for the brigade and the farm to gain a supplementary profit in excess of plan.

Conversion of brigades and livestock units to cost accounting does not mean that each brigade and each livestock unit is itself to solve all questions pertaining to production, without an organic tie to the other brigades and livestock units. The collective farms are large-scale enterprises all of whose branches must be intimately related with each other. Such problems of production as the planning of agricultural production within the brigade, the geographic distribution of crops, the planning of labor outlays per unit of output in the brigade, the planning of expenditures of materials and funds per brigade and per crop, the carrying out of the planting and the harvest, etc., should be solved on a collective-farm wide scale, and not by the individual brigade. Only if this is the case can such questions be solved correctly without damage to the common interests of the collective farm and the interests of the individual brigade and livestock unit.

However, in some collective farms, when the brigades and livestock units are converted to a cost accounting basis, the following tendencies are observed. The solution of all questions of production, and the full responsibility for the results of the productive activity of the collective farm are transferred to the brigade and the livestock units. Therefore, guidance and monitoring by the chairman of the collective farm and his assistants, with respect to the productive activity of the brigades and farms converted to cost accounting, is as necessary as in those collective farms where brigade-wise cost accounting does not exist. Lacking day-to-day guidance, individual sectors of production (brigades and livestock units) would be converted into virtually independent small collective farms. This would signify a step backward in the development of socialist collective-farm production. In this connection, cost accounting in the collective farms, must, as a matter of course, presuppose a corresponding form of organization of the individual incentive to the management of the collective farm in the development of highly profitable diversified operations.

In our opinion, the payment of collective farm management in accordance with gross production provides inadequate stimulus for the development of large-scale, high-profit collective-farm production. Therefore, the payment of collective-farm management on the basis of gross output should be supplemented by payment of workday units calculated either in accordance with the monetary net income or in accordance with the profit of the collective farm as a whole. In order for the collective-farm management to have a material incentive for a correct and most rational planning of collective-farm production, allocation of crops, planning of costs of production brigade by brigade, and in the creation of all the necessary conditions for expansion of collective-farm production, increase in output of agricultural produce per hundred hectares of arable land belonging to the collective farm increase in the labor productivity of the collective farmers and reduction in the cost of collective farm production, it would in our opinion be most desirable to compare the actual net monetary income of the

collective farm to its planned income, and to the net cash income actually derived by this farm in the preceding year. In accordance with the increase (or decrease) of the profit to the collective farm in the current year relative to its actual profit in the preceding year, the evaluation of the workday unit of the collective farm management should be raised or lowered accordingly.

The net income of the collective farm is the difference between the value of the gross output and all the expenditures going into its production. The great bulk of the gross output is sold by the collective farm. The receipts from sale of produce constitute the monetary receipts of the collective farm. To simplify the calculations, we are arbitrarily taking the net income to be the difference between the total monetary income of the collective farm and the monetary costs of production, i.e., the monetary net income of the collective farm. The monetary income of the collective farm is calculated by arriving at a total of monetary income due to field crop cultivation, vegetable growing, melon raising, meadow harvesting, orchards, berry plantings, vineyards and other plantings, livestock product not involving slaughter of livestock, produce of livestock slaughter (minus sums paid into the indivisible funds of the collective farm), sale of livestock (minus sums paid into the indivisible fund), income from subsidiary enterprises and other cash income. To determine the net income, the gross monetary income of the collective farm is reduced by all the monetary costs of production, i.e., sums expended for payment for repair services by the Repair and Equipment Stations, payment for planting by aviation, aerial fertilization, crop dusting, expenditures upon the purchase of fuel and grease, fuels used otherwise than in engines, seeds and fodder, electricity and water supply, mechanized cleaning of the irrigation system within the collective farm, measures to combat agricultural pests, veterinary services, purchase of small tools, raw materials and the needs of the subsidiary enterprises, current repair of structures, agricultural machinery, transport equipment, tools and other equipment, payments for transport services engaged for hauling produce, etc., as well as the amortization of fixed capital for the given year.

The monetary income, as well as the expenditures upon production, is determined by the collective farm in calculating the income subject to income tax. Thus, no further elaboration of these calculations is necessary. From the result, which constitutes the difference between the monetary income of the collective farm and the productive expenditures, it is necessary to subtract the sum paid for the labor of all persons working in the collective farm during the given year. The resultant sum is the net income of the collective farm. Of course, the net income thus calculated is not the complete income. A portion of the net income is not reflected in the monetary income of the collective farm. A portion of it goes into the national treasury through the intermediary of government purchase prices, and a portion of the net income of the collective farm may prove to be included in the payment for workday units, etc. Moreover, accumulations in kind by the collective farm are not allowed for here. Therefore, this net income indicator cannot always be used for comparisons of the profitability of the various collective farms, or of that of collective farms to state farms. However, it does permit, to within a certain approximation, decision as to the question of establishing a direct relationship between the payments to the collective farm management and the level of productivity of social labor, on the one hand, and the cost of collective-farm produce, on the other, and also to the profitability of the given collective farm. In the two years that the Lenin

ective Farm has functioned on the basis of a system of a-collective farm cost accounting, there has been a ceable diminution in costs of production, a reduction in cost of the produce, and an increase in the monetary in- e of the collective farm and the payment for the labor- unit. In 1955, 348,000 labor-day units were contributed his collective farm, and in 1958 the figure was 212,000, 36,000 less. In 1955 the collective farm gained a net etary income of 5,680,000 rubles, whereas in 1958 it about 8,000,000 rubles, or about 2,320,000 rubles more. 1955 each labor-day unit was paid for at 28 rubles. he great significance of brigade-wise cost accounting in the fact that it serves to involve all members of the ective farm in an active struggle for economic expendi- e of labor-day units, fodder and fuel, for careful treat- t of equipment, and for increasing the productivity of r and the quality of collective farm produce. Therefore, e desirable to introduce brigade-wise cost accounting in e collective farms of the country, including the most gressive, highly profitable enterprises. In order to y out these measures, which play a major role in the her development of collective-farm production, there is eed to calculate comparable costs based on identical ment for the labor done on an identical job quota in the ective farms of the given zone. The point is that in e farms this is based on a comparison of the results of work to the planned data, and in others to the actual rds of the previous year. However, brigade-wise cost ounting and payment to management in terms of the net me of a collective farm is readily performed in those ective farms which have already been converted to a e progressive form of payment of labor: direct mone- y payment of labor without reference to labor-day units. he introduction of cost accounting into all collective ns is of major significance for the further uplift of the omies of the collective farms at the new stage in their elopment. This will facilitate successful solution of the oblems posed by the 21st Congress of the CPSU before ialist agriculture during the seven coming years.

Marinko, V. Rabinovich:

Improving the System of Wages and Bonus Payments in State Farms

ross production and expenditures thereon constitute the r-all indices of the output of state farms. However, in p raising, the wage scales of the workers are not in ct relationship to the quantity and quality of produce, e to the final results of their labor. This inhibits the e of labor productivity. Let us present the pertinent e on the state farms in Kherson Oblast in 1957:

State farms	Labor outlay per centner of grain (man-days)	Pay per man-day for winter grains (rubles and kopecks)
Steppe	0.21	44-70
ed Perekop	0.28	24-90
Askania	0.15	28-00
ommunist In-ternational	0.24	20-20

As the table shows, labor productivity in the Askania State Farm is considerably higher than in the Steppe Farm, and payment per man-day is lower. A similar situation exists in two other farms.

The system of accounting of the work done by tractor operators provides a weak stimulus for the state farm per-sonnel. Until 1955 this accounting work was done by the agronomists, and subsequently this responsibility was placed upon the department managers. Today, in practice, this work is done by the brigade leaders of the tractor bri-grades. However, the brigade leaders have no material in- centive for monitoring the quality of the work, because their pay depends upon the number of shift quotas performed by the tractor operators in the brigade. Under these circum- stances, work below the required level of quality is not paid for, and the brigade leader holds back 10% of the cost of the fuel expended upon such work. But, if the brigade leader rejects work, his own salary is cut. It is therefore desirable that the earnings of the brigade leader be deter- mined by the volume of work done. In this situation, the brigade leader would have a material interest in the carry- ing out of the shift quotas of output by the tractor drivers, strict adherence to the demands of agricultural techniques, and reduction of the outlay of labor and funds per unit out- put.

Shortcomings in the system of payment to labor cause some state farms to expend excessive labor per hectare of crop cultivated. Moreover, an analysis of the activity of the state farms in Kherson Oblast shows that a false econ- omy in labor outlay is characteristic of certain farms. For example, in the Rogachik State Farm of Kherson Oblast, the outlay of labor in 1957 per hectare of harvest acreage in the field of winter grains was 23.2 man-hours, or 8.8 man-hours less than the average for the state farms of this oblast. However, this state farm harvested only 11 cent- ners of winter grains per hectare against a state-farm aver- age for the oblast of 15 centners per hectare. The result showed the Rogachik State Farm to have saved 0.8 man- hours more per centner than the average for the state farms of the oblast. Consequently, every saving in labor outlay per hectare of culture cultivated cannot be deemed econom- ically justified. It is necessary to economize in ways that will not reduce the yield per acre but will increase the pro- ductivity of labor.

Some state farms have converted, in their raising of field crops, to a system of payment to the workers in ac- cordance with the quantity and quality of the produce yielded (for example, the Shugarovo and the Teplichny State Farms of Moscow Oblast, the Bayaut No. 4 State Farm in Tash- kent Oblast, etc.). The new system of payment to labor pro- vides a material incentive to state farm workers to secure high harvests with minimum outlays of labor and funds. The personnel of field culture cultivating teams here have a material interest in the utilization of advanced agricul- tural techniques, the mechanization of the processes of pro- duction, and a proper organization of labor, where this has a positive effect upon the results of production. In Bayaut State Farm No. 4, the brigade of Comrade Bekirov raised 30.2 centners of raw cotton per hectare on a 50 hectare acreage in 1958, whereas in 1957, prior to the introduction of the new system of payment for labor, it obtained only 9.4 centners per hectare, and in 1956 12.5 centners per hectare. In 1958, the brigade lead by Comrade Memedov of the same branch of this state farm, working under the old system of payment for labor, and under identical condi- tions as those of Comrade Bekirov's brigade, raised only 9.5 centners of raw cotton per hectare. The labor outlays per centner of cotton in Comrade Bekirov's brigade were

2.45 man-days in 1958 as against 16 man-days in 1957, and the expenditures upon the payment of labor were respectively 66 rubles and 248 rubles. Yet the earnings of the members of the brigade showed a sharp increase. The brigade, applying all-round mechanization, raised the cotton plants by the square cluster method, and conducted all measures of cultivation with high skill. The following is typical. In 1957 the cotton plants were watered 4 or 5 times, and in 1958 only twice, but the timing was better. Previously 6 or 7 cultivations were performed, and in 1958 there were 5 the long way and 3 or 4 crossways. Cultivation was combined with side-dressing, and this made for an improved crop and a greater saving of labor.

An increase of production should also be stimulated by the system of bonuses to workers and brigade leaders in kind and in money. To a considerable degree, the present system of bonuses does not meet this requirement, but it provides an inadequate stimulus for reduction in expenditures of labor and funds per unit of production. Bonuses are paid only for the amount of produce put out, without consideration of its cost and of economies in direct expenditures. True, machine operators are given bonuses for saving fuel and for maintenance of the tractors in their care, and pig farm personnel are given bonuses for saving feed. Other workers in field cultivation and livestock farming receive no bonuses for high qualitative results. Thus, in the Red Guerrilla State Farm of Kherson Oblast, the 5th division expended 30 rubles and 90 kopecks' worth of feed per centner of milk produced, whereas the 6th division expended 49 rubles and 90 kopecks' worth, or in other words

19 rubles more. Moreover, if the gross yield of milk in these brigades were to be compared, the difference would be even greater. However, the differences in the expenditures of feed and the economies related thereto were not reflected in the wages of the workers of the 5th division.

The workers of the divisions, farms and brigades should, in our opinion, be paid bonuses for economies in direct outlays, these bonuses to be calculated per unit of produce, a given percentage of the economy being paid to those responsible for it. This would play an important role in bringing intra-farm cost accounting, whose purpose is reduction of labor costs and cost of production, to life.

The degree to which consideration of, and material incentive for, economy in productive outlays deserves consideration is borne witness to by the following data on output and cost of production in divisions of the Red Guerrilla Collective Farm in Kherson Oblast in 1957.

These data show that an evaluation of the work of divisions of a state farm in terms of gross output alone does not always reflect the skill with which the work was done. In farms where intra-state farm cost accounting is lacking, differences in the funds expended per unit of production of the identical produce in different units of the farm cannot be seen, and the managers of the various units do not note the existence of internal resources for reduction of costs of production. It seems to us that the most important cause of weak development of intra-collective farm accounting in the state farms is the absence of a proper system of material incentive for reducing the costs of production.

	Division					
	1-e	2-e	3-e	4-e	5-e	6-e
Grain yield, excluding corn (centners per hectare)	13.8	13.4	15.1	14.2	15.1	12.4
Cost per centner of grain, excluding corn (rubles and kopecks)	17-45	23-15	19-64	21-34	15-56	22-10
Milk per cow (kilogram)	2,660	2,707	2,763	—	2,792	2,700
Cost per centner of milk (rubles and kopecks)	94-00	92-90	89-25	—	70-90	99-08

A correct organization of wages and bonuses not only to workers but to the managerial personnel and the specialist personnel of state farms is of major significance in creating material stimuli.

As of January 1, 1957, a new and progressive system of payment for labor and of bonuses to managerial personnel and specialists was introduced into the state farms. According to this system, they are paid on the basis of the value of the produce sold (except that in the case of division personnel their payment is based on gross output). However, despite its positive sides, this system requires some improvement, in our opinion. For example, the scales paid to zootechnicians and veterinary workers depend not only upon the results attained in livestock farming but on those attained in the raising of crops where they are personally not involved. The same situation applies to the payment of agronomists and land-improvement experts. Thus, the scales of certain types of specialist personnel are determined not by the scale and quality of the work they themselves engage in, but by the scale of output in all branches of the business. As a result, personnel performing less complex work obtain salaries equal to and sometimes even

higher than those of personnel in charge of more critical sectors of production. If a field directed by a given specialist functions poorly, his salary will be relatively higher due to the good work of other departments of the state farm and vice versa. All this tends to create equalitarianism in payment to labor. In order to eliminate it, the level of salaries paid to specialist personnel must be placed in direct relationship to the results of the work in the branches in which they are engaged. This same principle has to be employed in the system of bonuses. However, crop and land-improvement experts should have a material incentive in the establishment of a reliable fodder supply for livestock raising. Therefore, the level of their salaries should be determined by the value of the crops grown sold to the government and the value of the fodder produced for livestock.

The divisions (livestock units) of state farms do not themselves engage in the sale of produce, and therefore the calculation of the scales of wages and the monetary bonuses to their managers and specialist personnel is based upon the gross value of their agricultural produce. However, when the value of gross production is determined on

division or livestock unit basis, the value of weight gain and natural increase in livestock is calculated on its planned cost as approved for the state farms as a whole. This method of evaluation does not stimulate a reduction in the cost of livestock output. The planned cost of production of livestock depends to a considerable degree upon the real cost of seeds produced during the preceding year. However, the cost of production of fodder differs sharply in various farms in accordance with the level of organization of the farm. This is also a cause of a difference in the planned cost of livestock output in various farms, which is usually lower in farms that are functioning well, and higher in those that are functioning poorly. The result is that the managerial personnel of the divisions and the farms have an incentive not to reduce but, contrariwise, to increase the cost of fodder, which increases the value of the gross output, and correspondingly increases the salaries of the personnel of the divisions and the livestock units.

It seems to us that it would be more correct, in determining the wage scales, to evaluate the value of weight gain and natural increase in livestock, in calculating gross output of the divisions or livestock units, on the basis of the average government sale prices for meat from the given state farm. In this situation, the calculated scales for the personnel of the divisions or livestock units of the various state farms, working under identical conditions and having different volumes of production, would be identical. It must be noted that the system of bonuses to managerial personnel and specialists provides an inadequate stimulus

to reduction in cost of production. This is explained by the fact that the scale of bonuses for production over the plan is not dependent upon its cost. This may be avoided by reducing the scale of the bonuses if the plan for reduction in cost has not been met.

Prior to 1957, a system was in operation under which the total annual bonus for managerial personnel could not be higher than their basic salary for eight months, whereas for specialist personnel six months' total salary represented the bonus limit. In 1957 and 1958 there was no ceiling on bonuses. This not infrequently resulted in situations in which certain state farm executives got bonuses of tens of thousands of rubles, converting the bonus system from a supplementary source to the major source of income, and downgraded the role of wages. The decision taken this year to limit the scale of bonuses for this category of personnel to a total not greater than six months' salary corrected this serious shortcoming in the field of wage organization.

Improvement in the system of wages and of bonuses to personnel is of major significance not only to the state farms but the collective farms converting to a monetary system of payment to labor. It is important that the collective farms acquire and improve upon the experience of labor payment systems in the state farms, with due consideration for the special features of collective farm production. This will improve the material incentive to collective farm personnel and encourage the development and reinforcement of the economies of the collective farms.

A. Sokolovsky:

An Economic Conference of the Industrial Enterprises of the Kiev Rayon of Moscow

The 21st Congress of the Communist Party of the Soviet Union has posed before party organizations the problem of assuring so rhythmic a pattern of operation of all enterprises that government plans will be fulfilled and overfulfilled with respect to all quantitative and qualitative indices from day to day and from month to month. This requires a more complete discovery of intra-enterprise resources and possibilities for increasing output with existing capacities. It requires a constant improvement of technology and the organization of production, improvement in the utilization of equipment, of raw materials and other materials. Economists at the scientific level can give significant assistance in the fulfillment of this objective, as can persons directly engaged in industry. In cooperation with both these categories, and at the initiative of the Kiev rayon committee of the Communist Party in Moscow, a rayon economic conference was held at the end of March 1959 on the subject matter: "Utilization of Reserves for Increasing Production so as to Bring About a Further Rise in Labor Productivity." It was participated in by more than a thousand persons representing more than a hundred factories and plants: plant managers, innovators in production, engineering and technical personnel, members of Communist Labor Brigades. A group of the scientific personnel of the Economics Institute of the Academy of Sciences of the USSR took active part in the conference.

The conference was preceded by a great deal of preparatory work. Over a three-month period, problems of improving the organization of production and utilization of available resources for increasing labor productivity were studied at a number of the largest enterprises in Kiev rayon. All the papers read by these practical workers were prepared with the participation of the scientific personnel of the Economics Institute of the USSR Academy of Sciences.

In opening the conference, the secretary of the Kiev rayon committee of the CPSU, N. I. Savelov, stated that the 21st Congress of the Communist Party of the Soviet Union had outlined a grandiose plan for the development of the national economy of the USSR. Major perspectives were opened during the current seven-year plan before industry in the Kiev rayon of the capital. From 1959 to 1965, there is to be a 60% increase in the output of mass-produced items in this rayon, and this is to be accomplished without change in the existing industrial floor space, but merely by improving the technological processes and by maximum utilization of automation and mechanization. In this connection, the following problem faces the personnel of industry in this rayon: that of setting forth those directions and forms of work which would permit not only fulfillment but overfulfillment of the objectives of the seven-year plan.

S. A. Kheyman, senior associate of the USSR Academy of Sciences' Institute of Economics, delivered the main paper at the general meeting: "Improvement in the Organization of Industrial Production and Utilization of Resources

for Increased Labor Productivity."

The reporter examined problems of resources for improving the organization of production at industrial enterprises both in the fields of the fundamental and of the auxiliary production processes. He noted that technological progress in recent years was reflected to the greatest degree in the processes of fundamental production and to a considerably lesser degree in the auxiliary and servicing processes, the technological foundation and organization of which is changing considerably more slowly. The paper drew attention to the great resources that could be brought into operation in such areas as the organization of the repair and tool divisions of enterprises, intra-plant transport, monitoring equipment, etc.

After the general session, the participants of the conference continued their work in four round tables: one on machinery manufacture, another in chemistry, a third for light industry, and a fourth for the foodstuffs industry. At the meetings of the machinery manufacturing round table, the following papers were heard: "Methods of Improving the Organization of Production and Increasing Labor Productivity," "Improvement of the Organization of Auxiliary Types of Production as a Factor in Increasing Labor Productivity," "Improving the Structure of Management of Production." As a result of discussion of these papers, the participants in the round table took note of the fact that it will be necessary, in the next two or three years, to bring the level of automation and mechanization of production at machinery manufacturing enterprises up by 60-70%, and to develop designs that are economical both in shape and weight, while improving their operating characteristics. Designs of this kind should be made with provision for employment in their manufacture of the methods of machining and assembly that yield the very highest rates of output, basing this on large-scale standardization, unification and normalization of assemblies and parts.

The round table recommended that shaped billets and semi-fabricated items be employed widely in designs, and that the essential shapes of structural units be given to them in the preliminary phases of production. Taking note of the great expenditures made for the maintenance of auxiliary departments and services, the participants of the section recommended that their organization be improved by centralizing repair plants under the Moscow city economic council.

The chemistry industry round table heard and discussed the following reports: "All-Round Mechanization of Production, Improvement in Organization Thereof, and Increase in the Productivity of Labor at the Dorkhimzavod," and "Problems of Organization of Auxiliary Operations." In the recommendations adopted by this round table, note was taken of the need to develop a plan of engineering progress during the seven-year plan for the Dorkhimzavod with allowance for all-round mechanization not only of individual operations and departments, but of the plant as a whole, giving due attention to automation of production.

Plastic products are being made in relatively small quantities at a number of enterprises in the rayon. The round table deemed it necessary to study the question of creating a department or even a plant for centralized production of these products, particularly those needed by the television and ether plants, the pencil and brush factories, which are

making these products independently and are poorly utilizing the available equipment. It was recommended that this equipment that should be used for setting up the mentioned department or plant.

Participants in the light industry round table, which was large, heard and discussed the following reports: "Improving the Organization of Production and Increasing Labor Productivity," "Methods of Reducing the Costs of Production and of Reinforcing Cost Accounting" (based on data from clothing factories).

The recommendations adopted on the basis of these reports suggest that the State Planning Commission of the USSR, the Moscow City Economic Council and the government of the city of Moscow take up the question of fundamental improvement of supply of spare parts both of Soviet-made and of imported machines for equipment now in operation and also the problem of increasing the output of new models of machines. It is also necessary to solve the problem of concentrating major and medium overhaul of equipment, specifically of sewing machines, at specialized enterprises, and of creating a central exchange depot for the machines used on a very large scale, and for fixtures in this category. The round table suggested that a special subsidiary sorting warehouse be established in Moscow to supply the enterprises with fabrics, furniture and other types of materials on the basis of advance orders as well as on selection.

It was recommended that work in the specialization of enterprises in light industry, and for further unification of all enterprises, be continued not only within the rayon but within the capital city as a whole. The Moscow government should solve the question of stabilizing the prices and speeding the approval of prices for the final products of light industry enterprises subordinate to the government, and should, in particular, unify the prices for work done in shops providing personal services to the population.

The food industry round table heard the following reports: "Methods of Improving the Organization of Production and Increasing Labor Productivity" (based on data from the Yevyev Plant), and "Problems of Cost Accounting and Cost Reduction in Industrial Production" (based on data of the Mikoyan Moscow Refrigerator Plant).

The recommendations of the section note that mechanization and automation of all time-consuming processes should be carried out in those departments where heavy manual labor is currently involved. The round table holds that elimination of laborious manual jobs at grain elevators and the creation of normal conditions for barley storage requires construction, by 1964, of a number of silos at enterprises now in existence. This will make it possible to cut costs and improve the quality of the produce.

The participants in the conference suggested that the recommendations of the round table be made the basis for the activity of business, Party and trade union leadership so as to mobilize the personnel of the enterprises of the Kiev region of Moscow for fulfilling the objectives of the seven-year plan ahead of time.

d Cúkor:

Work of the Institute of Economics of the Hungarian Academy of Sciences

The Economics Institute of the Hungarian Academy of Sciences was founded at the end of 1954. Prior to its

establishment, no independent Marxist investigation of problems of the Hungarian economy had been conducted, for all practical purposes. Therefore, the choice of subject areas and methods of investigation was and is of major significance to the personnel of the institute. In determining the subject matter for scientific investigations, the most important problems before the national economy of the Hungarian People's Republic are given primary attention. And the real capacities of the institute, the knowledge and experience of its scientific personnel have to be taken into consideration.

Usually, the research associates of the institute will work for some weeks upon preparation of a given theme. This theme is then given final acceptance only after people have familiarized themselves thoroughly with the material and discussed it. This approach to thematic material is due to the fact that it has sometimes been necessary to reject certain subjects of investigation after a month or two of preparatory work because the project proved to be unrealizable, for whatever reason. However, in the majority of cases, even the preparatory work is of value in the form of a scientific outline or article.

In 1958, the five departments of the institute (general economics, industrial, agricultural, financial, and international) worked on the following problems: the improvement of the system of material incentives and better utilization of the categories of value; improvement of the planning of the national economy; improvement of methods of planning, and discovery of objective economic relationships constituting the foundation of planning. The subject matter of scientific investigations included problems of the socialist transformation of and intensive development of Hungarian agriculture, a study of new phenomena in the world capitalist economic system, and a critique of bourgeois and revisionist views on economics. Certain subject areas are being developed simultaneously by more than a single division. This makes for a better organization of the research work and a multi-faceted study of the various problems.

In order to provide a picture of the nature of the scientific research work of the institute, let us discuss some of these studies. One of the investigations that has been brought to completion deals with the incomes of workers and office workers from social and cultural funds. These are termed, arbitrarily, "indirect income." Distribution in accordance with labor contributed by means of differentiation of incomes of the working personnel constitutes a direct material incentive. However, indirect incomes contain elements of distribution in accordance with need.

The study under examination notes that in 1955, 48% of the indirect income represented public health, education, and similar measures. The remaining 52% related to the work done by the earner (low cost meals at restaurants, plants and institutions, free apartments or dormitory accommodations, cut-rate railway tickets). Detailed analysis led to the conclusion that the indirect income of the first group should, in the interests of socialist society, be granted not in accordance with the labor contributed, but in accordance with need. Certain types of indirect income were not only desirable but essential for the solution of certain problems (for example, for guaranteeing a labor supply at certain enterprises, etc.). The provision of certain other types of income in this category reflected local interests. Therefore, certain portions of this type of income should undergo further change in the future. The scale of indirect income varies from group to group and family to family. For example, it is calculated that there are 56 forints of indirect income for each hundred forints of wages paid. However, some families get 5 to 6 times as much as this,

and others get virtually no such income. This is natural when we speak of income in the first group identified above, but is incorrect for the portion of this type of income relating to labor performed (meals at discount, etc.).

The fundamental investigations carried out by personnel of the institute in 1958 were directed toward improving the methods and the quality of planning of the national economy. The objective of these investigations was establishment of the objective interdependencies constituting the basis of planning. Last year, the subjects under discussion were chiefly problems of industry and agriculture, and in particular the structure of relationships of production within the machinery manufacturing industry and between it and other industries. The study of questions pertaining to this theme was conducted with the assistance of a balance of departmental relationships. This year, a similar investigation was undertaken in the field of the iron and steel industry. Similar studies are being carried out in close collaboration with the Central Statistical Administration of the republic. In 1958, the CSA compiled the first complete departmental column-and-line balance of the social product of the Hungarian national economy. In developing the data for the iron and steel industry, and in part for the machinery manufacturing industry, for this total balance sheet, the CSA employed the results of theoretical investigations carried out in this institute.

In investigating questions of labor productivity in industry, the institute analyzed its growth and developed the most desirable methods of analysis for a long period for the various branches (the iron and steel industry, and the cotton textiles industry). Moreover, an effort was made to find convenient methods of comparing labor productivity in the industries of various countries and of carrying out certain calculations to illustrate these methods.

A special investigation was devoted to problems of providing technical personnel to the Hungarian economy, particularly to factories and plants. In this connection, an examination was made of the dynamics of increase in the number of engineers and technicians in Hungary, the distribution thereof among the most important branches of the economy and divisions of industry, etc. The data adduced in this study show that the Hungarian People's Republic, along with other socialist countries, has attained considerable progress in the field of training engineering personnel not only when one makes comparison with backward capitalist Hungary, but when one compares the figures to those for western capitalist powers. However, shortcomings in this field were also noted (unsatisfactory analysis and study of the rates of training of personnel, an inadequately elaborated method of planning this training, etc.). Therefore, in the investigation by the institute devoted to this problem, there was proposed a scientifically valid method of planning for the more distant future (10-15 years) with consideration of the real needs of industry and other branches of the national economy. The authors of the study come to the conclusion that the planning of the training of specialist personnel has to be conducted on a centralized basis, with a critical approach to the requirements of the various enterprises for technical personnel.

Of practical significance is the study of balances of the labor force carried out by the institute, and compiled for several periods each year with respect to various branches of agriculture. The balance of labor resources was studied separately for the various territories and provinces with the object of finding the best methods of utilizing the available labor force and of introducing rational mechanization, of outlining a proper structure of production, etc. With respect to other themes, an investigation was made of the

dynamics of labor productivity in agriculture since 1949, and the influence thereon of a number of factors, of problems of the economic efficiency of capital investments in agriculture. The long-term demand for agricultural products was defined, etc.

In addition to the problems listed above, an investigation is being conducted into the process of distribution and redistribution of the national income, founded on calculation of the national income and the financial balances. A method is being developed for comparing national incomes and economic development in various countries.

The intensive development of Hungarian agriculture and the socialist transformation thereof have demanded that the institute study the role of simple forms of cooperation and systems of distribution of incomes in producers' cooperatives. In a study titled: "An Economic Analysis of the Activity of the Machine and Tractor Stations During the Last Five-Year Plan," the economic efficiency of the Machine and Tractor Stations was examined on the basis of a study of the expenses of production of all the Machine and Tractor Stations in Hungary. Expenditures for particular types of work done by machine were investigated, etc. In this connection it was established that despite major material outlays, the development of the Machine and Tractor Stations lagged behind the growth of the cooperative movement in the countryside.

The investigation also shows that mechanization of producers' cooperatives by their own efforts would be more profitable. However, Hungarian agriculture is still in need of major socialist transformations, for the most part. Under these conditions, the Machine and Tractor Stations are necessary. At the same time, there are, in the republic, producers' cooperatives for whom it is more profitable to have their own fleets of agricultural machines. This must, of course, be taken into consideration in the further development of agricultural cooperatives in Hungary.

In order to shed light upon the practical possibilities for the application of mathematical methods in the economy, a determination of the optimal program for transportation of sugar beet and distribution of sugar production among the various mills was undertaken. This study was carried out by means of linear programming and other mathematical methods. The calculations took into consideration expenditures upon transport, various productive expenditures of individual sugar mills, as well as losses of sugar in the beet when beets are stored under different kinds of conditions.

Several studies to be carried out in 1959 are devoted to an investigation of new phenomena in the world capitalist economy and to a critique of contemporary bourgeois and revisionist theories. Thus, one of the studies is devoted to the interrelation between the North American and West European cycles of economic development, and another to a critique of Keynesianism from the viewpoint of Marxism-Leninism. The plan of work to be done by the institute in 1959 includes the same fundamental problems that were investigated during the preceding year. A portion of these themes is being carried over from 1958 to 1959. New and important in the plan for the current year is the effort expressed therein by the institute's personnel to give real assistance to the State Planning Commission in the solution of practical and theoretical problems of long-range planning for the next 15 years.

Certain new themes are intimately related to work previously done. Thus, an investigation of the volume of consumption of industrial commodities to be expected over a 15-year period is intimately related to a study performed on the system of retail prices. Determination of the

tion to be followed in price policy that would spur an increase in agricultural production during the next 15 years based on an investigation of the profitability of production of various types of agricultural produce. Underlying studies of long-range planning of the living standard of the population in People's Hungary are investigations related to determination of the influence of indirect incomes of the working people upon their budget.

In order to bring about more rapid employment of the results of its scientific investigations in practical work, the institute is placing some of its studies at the disposal of interested government agencies prior to publication. A large portion of its work is published in annual, and in the form of monographs. Thus the following books were published in 1958: Limits of Accuracy in Determining the Profits of Enterprises by László Lukács and Marton Sági; The Inflation of 1945-1946 and Stabilization by Sandor Aus. The following works are in preparation for the press: Problems of the Market Under Capitalism and International Economic Equilibrium by György Henzel, The Role and Special Features of State Capitalism in the Economic Development of Backward Countries by Ferenc Molnár, and An Analysis of the Economic Functioning of Machine and Tractor Stations by Zoltan Kelemen. The institute's publication, the magazine Economic Research, publishes articles illuminating the results of various scientific investigations. Some of these are of narrow departmental interest. Therefore, at the beginning of this year the institute proceeded to publish a specialized series of bulletins of the Institute of Economics, in which studies of this kind are printed in small editions. This series contains, for example, Ferenc Vág's study: "The Amount of Money in Circulation and the Monetary Resources of the Population." At the present time, a study titled: "The

Requirement for and the Supply of Engineers and Technicians in Hungary" by Dörd Cukor and Janos Timar, is being readied for the printers.

The scientific council of the institute plays an important role in the organization and guidance of this research. At the meetings of this council discussions take place both of the plans of investigations to be carried out, and of studies performed, as well as of questions of the organizational and scientific research work of the institute. Leaders of the party and of government agencies, professors and other economic specialists are members of the council. Discussion of studies in progress, at the meetings of the Scientific Council, assists in improving the theoretical level and practical value of those works for the future.

Personnel of the State Planning Commission, of the ministries dealing with economic affairs, of the CSA, and of other organizations and enterprises participate regularly in the meetings in the departments of the institute. The institute involves collaborators not on its staff, as well as specialists having practical experience in its scientific research work. Some personnel of the institute participate in the work of working commissions of the government, for example, in the Hungarian groups of the sectors of the Council of Mutual Economic Assistance. The institute is collaborating with other scientific research and educational institutions. It is particularly intimately involved with the Karl Marx University of Economics.

An important objective of the institute in the present year is a study of the problems of economic collaboration of the socialist countries, and definition of Hungary's role in the international socialist division of labor. Realization of this study was greatly assisted by the conference of representatives of Institutes of Economics of the socialist countries held in December 1958 in Prague.

KAROTAMM (Continued From Page 21)

medium stations could fulfill a secondary yet important role in increasing the electric power resources.

The building of small and medium stations in the countryside has considerable importance in helping to solve the task of gaining maximum time in the economic competition of our country with capitalist lands. It should be noted that the *Gidrosel'electro* devotes insufficient attention to thermal electric stations in the countryside. According to its calculations in Soviet agriculture it is necessary to put into operation 9 million kw. new power capacity: 6.6 million kw. by means of linking up with the industrial electric system, and 2 million kw. by building hydroelectric stations and only about 400,000 kw. through thermal stations. This proportion needs to be changed by increasing the specific weight of the thermal stations. It should be noted that the

proportion of power to be taken from connections with industrial circuits and building hydropower and thermal power stations will vary considerably in different zones and regions.

Our land has all possibilities to build and put into operation in the future all the capacity needed for the full electrification of agriculture. It is necessary to use all means to stimulate the initiative of the collective and state farms, Tractor Repair Stations and other enterprises in the countryside, in the job of building electric stations. It is necessary to substantially enlarge the production of machinery and equipment for building small and medium electric stations. The advance of electrification in agriculture gives the possibility of more rapidly fulfilling the great task set by the 21st Congress of the Communist Party, Soviet Union for agricultural progress in our country.

KOZLOV (Continued From Page 43)

(7) *Ibid.*, p. 47.

(8) L. Kelso, M. Adler, *The Capitalist Manifesto*, New York, 1958.

(9) Cited in the handbook "Revisionism — the Main Danger," *Gospolitizdat*, 1958, p. 238.

(10) *Ibid.*, p. 237.

(11) "Nasha stvarnost," 1957, no. 3 (our emphasis-A. K.).

(12) *Ibid.*, 1958, no. 5.

(13) V. I. Lenin, *Collected Works*, Vol. 32, pp. 62-63.

(14) Cited in an article by comrade Li Li-san ("Tsin-tsi Yan-tsu," 1958, no. 8).

(15) This conclusion could also be corroborated by an analysis of social relations in the FPRY and the results of the development of the Yugoslav economy during the last ten years.

(16) M. Djilas, *The New Class*, New York, 1957, pp. 44-45.

(17) L. Kelso, M. Adler, *op. cit.*, p. 105.

(18) "Der Monat," February 1958.

(19) H. Marcus, *Soviet Marxism: A Critical Analysis*, New York, 1958, p. 81.

(20) V. I. Lenin, *Collected Works*, Vol. 27, p. 213.

(21) *Ibid.*, p. 185.

KHEYNMAN (Continued From Page 78)

ber thereof accurately. In any case, they did not constitute more than half the total of electric motors. (Census of Manufactures, 1954. Bulletin M-36-A p. 22).

(23) Census of Manufactures, 1954, Vol. II. Bulletin MC-35A p. 16; Facts for Industry.

(24) *Annual Survey of Manufactures*, 1956, p. 100.

(25) *Ibid.*, pp. 182-187.

(26) Not including electrical and transportation machinery manufacture and excluding production of refrigerators and machine parts. The branches of industry considered in the table embrace 863,000 workers and produce \$16,100,000 of products.

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